

# C4 Finance Financial Calculator

for the Palm OS™



## Notice

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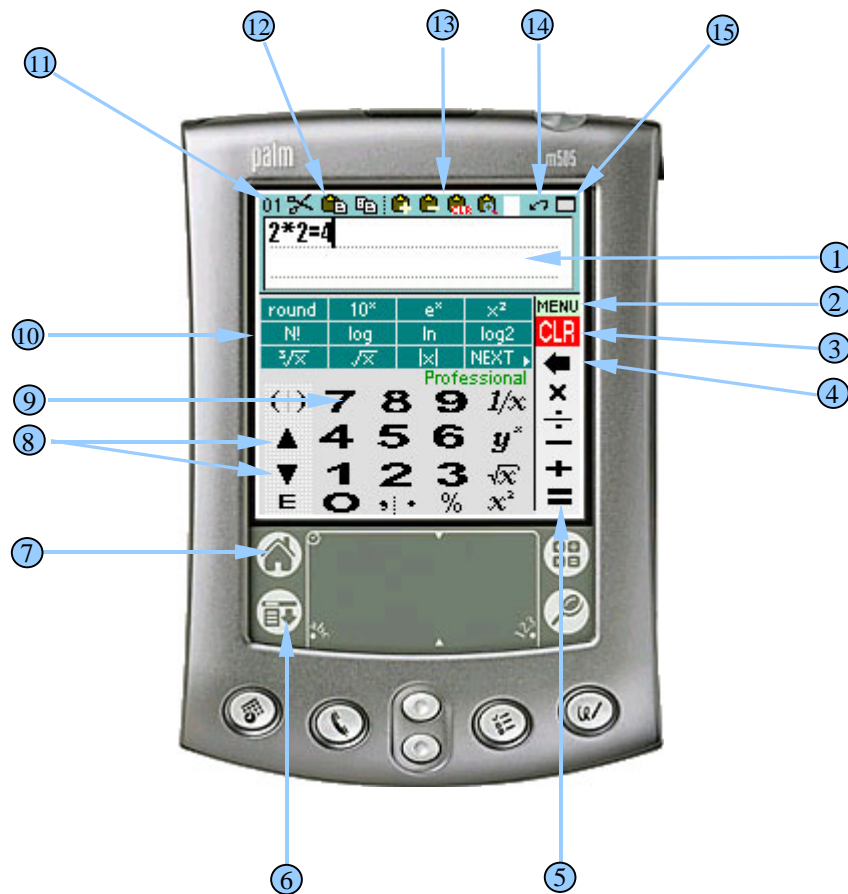
Edition	August, 2001
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## Contents

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<b>WELCOME TO C4 FINANCE.....</b>	<b>6</b>
<b>GETTING STARTED.....</b>	<b>7</b>
SYSTEM REQUIREMENTS.....	7
INSTALLING C4FINANCE.....	7
UNINSTALLING C4FINANCE.....	7
EDIT FIELD.....	8
EDITING.....	8
CALCULATIONS.....	10
<i>The percent key.....</i>	<i>12</i>
<i>Apostrophe as thousand separator. Why? .....</i>	<i>12</i>
MULTIPLE EDIT FIELD.....	13
CATEGORY MENU AND FUNCTION PAD.....	14
VARIABLES.....	15
CLIPBOARD.....	16
GENERAL RULES FOR WORKSHEETS.....	16
<b>MAXIMIZED EDIT FIELD AND LOG.....</b>	<b>18</b>
<b>PREFERENCES.....</b>	<b>19</b>
<b>USER DATA MANAGER.....</b>	<b>21</b>
SPECIAL FUTURES.....	21
<b>FINANCIAL CALCULATIONS.....</b>	<b>24</b>
TIME VALUE OF MONEY.....	24
<i>Time Value of Money worksheet.....</i>	<i>25</i>
<i>Create new Time Value of Money list.....</i>	<i>25</i>
<i>Load existing worksheet.....</i>	<i>26</i>
<i>Calculations.....</i>	<i>26</i>
<i>Amortization table.....</i>	<i>26</i>
<i>Examples.....</i>	<i>28</i>
CASH FLOW CALCULATIONS.....	30
<i>Cash Flow worksheet.....</i>	<i>31</i>
<i>Creating a Cash Flow list.....</i>	<i>31</i>
<i>Load existing worksheet.....</i>	<i>32</i>
<i>Calculations.....</i>	<i>32</i>
<i>Entering Cash Flows.....</i>	<i>32</i>
<i>Examples.....</i>	<i>32</i>
Theory.....	35
Why do I need to enter guesses?.....	35
BOND.....	36
<i>Bond worksheet.....</i>	<i>37</i>
<i>Calculations.....</i>	<i>37</i>
<i>Examples.....</i>	<i>37</i>
DEPRECIATION.....	41
<i>Depreciation worksheet.....</i>	<i>41</i>
<i>Calculations.....</i>	<i>42</i>
<i>Examples.....</i>	<i>42</i>

INTEREST RATE CONVERSION. ....	46
<i>Interest rate conversion worksheet.</i> .....	46
<i>Calculations.</i> .....	46
<i>Example.</i> .....	46
BREAKEVEN. ....	47
<i>Breakeven worksheet.</i> .....	48
<i>Calculations.</i> .....	48
<i>Example.</i> .....	48
ACTUARIAL FUNCTIONS .....	50
<i>Single Payment Present Value.</i> .....	50
<i>Single Payment Future Value.</i> .....	50
<i>Uniform Series Present Value.</i> .....	50
<i>Uniform Series Future Value.</i> .....	51
<b>BUSINESS CALCULATIONS. ....</b>	<b>52</b>
<b>STATISTICS CALCULATIONS. ....</b>	<b>55</b>
STATISTICS. ....	55
<i>Statistics worksheet.</i> .....	56
<i>Create new Statistics list.</i> .....	56
<i>Load existing worksheet.</i> .....	57
<i>Calculations.</i> .....	57
<i>Regression models and analysis.</i> .....	57
<i>Examples.</i> .....	58
<i>Distribution functions.</i> .....	61
<b>TIME CALCULATIONS. ....</b>	<b>67</b>
<i>Time worksheet.</i> .....	67
<i>Calculations.</i> .....	68
<i>Order of calculations.</i> .....	68
<i>Examples.</i> .....	69
<b>EQUATION SOLVER. ....</b>	<b>76</b>
<i>Equation Solver worksheet.</i> .....	76
Main Form .....	77
Equation Editor .....	77
Graphics Explorer .....	78
<i>Calculations.</i> .....	78
<i>How Equation Solver works. Limitations.</i> .....	79
<i>Examples.</i> .....	82
<b>TRIGONOMETRY. ....</b>	<b>88</b>
<b>CONTACTING C4FINANCE DEVELOPERS. ....</b>	<b>90</b>
<b>CREDITS. ....</b>	<b>90</b>
<b>SPECIAL THANKS. ....</b>	<b>90</b>
<b>INDEX. ....</b>	<b>91</b>



1. Edit Field

2. Category menu

3. Clear Edit Field.

4. Backspace

5. Arithmetic operations

6. Application menu

7. Application exit

8. Change Edit Field.

9. Number pad

10. Function pad

11. Edit Field number

12. Clipboard standard operations

13. Clipboard extended operations

14. Undo button

15. Maximized Edit Field and log

## Welcome to C4 Finance.

---

C4 Finance is a new generation calculator for Palm® Computing platform with the following features.

- Multi-line edit field with standard text editor convenience.
- With the multiple edit fields you can work with several problems simultaneously.
- Calculation Log let you choose previous problems and helps organize your calculations.
- Undo button provides easier editing process.
- Extended clipboard operations let you transform the standard clipboard to a convenient calculator's register.
- Category menu and Function pad let you use any of the Built-in functions and worksheets almost instantly.
- Variables worksheet allows viewing, editing and saving your task variables.
- Internal reference helps view information about any function.
- Built-in worksheets solve the following tasks:
  - **Time Value of Money.**
  - **Cash Flow.**
  - **Interest Conversions.**
  - **Bonds.**
  - **Depreciation.**
  - **Breakeven.**
  - **Statistics.** Mean, correlation coefficient, 6 regression models for two variables.
  - **Time.** Timeline calculations.
  - **Equation Solver.** Type an equation and then solve for any unknown variable. No programming needed!
  - **Graphics Explorer.** Look up and explore functions. You can make reasonable guesses for equation solver.

## Getting Started

---

### System Requirements

- Palm OS™ 3.1 and later; go to “Version” form in the application launcher (Menu button (next to Graffiti area)→App→Info... tap “Version” button. Palm OS version appears at the top of the screen)
- 550Kb memory (600Kb recommended) (Menu button (next to Graffiti area)→App→Info... tap “Size” button. Free memory value appears at the top of the screen)

### Installing C4Finance

Note: To install the application, the Palm Install Tool must be installed on your PC (Palm Install Tool is a part of Palm™ Desktop Organizer Software with your Palm connected organizer). We also recommend reading your Palm connected organizer manual.

1. Make sure that you have enough memory on your Palm to install C4Finance (see System Requirements).
2. Unzip C4full.zip file.
3. Double-click on C4.prc file.
4. Double-click on MathLib.prc file (if you do not have it on your Palm).
5. Tap “Done” or “Exit” button, to close Palm Install Tool window.
6. Perform a HotSync (HotSync Manager must be running).

**Installation complete.**



Finance - for black and white devices.



Finance - for color devices.

Click the application icon to run it.

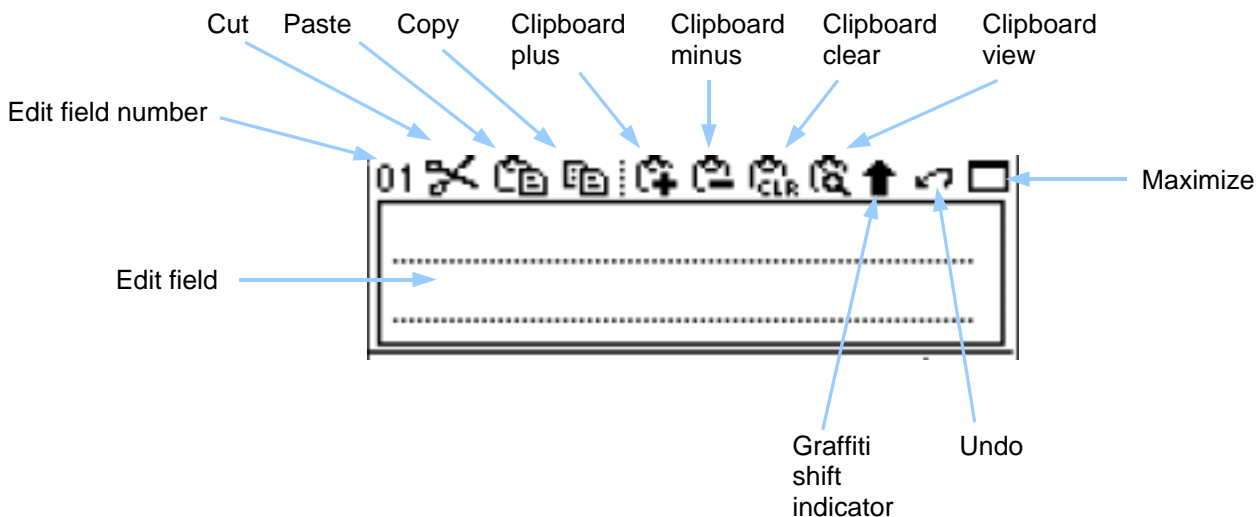
### Uninstalling C4Finance.

1. Go to “Delete” form in the application launcher (on your Palm). (Menu button (next to Graffiti area)→App→Delete...)
2. In the list choose “Finance” and tap “Delete...” button
3. Confirm deleting. Tap “Yes”.
4. Tap “Done” to complete deleting and return to the application launcher.

**C4Finance application is uninstalled.**

## **Edit field.**

The edit field is the main part of the application where you can enter data and see the result. Each symbol shown here has a special meaning.



Edit field is an area where you see numbers or letters you enter and the result of your calculations.

Edit field number shows current active edit field.

Copy, Paste and Cut are standard clipboard operations.

Clipboard plus and minus let you add or subtract selected area to the clipboard.

Clipboard clear is a button to clear the clipboard.

Clipboard view shows the clipboard content window.

Undo removes your last action.

Maximize button switches regular edit field mode to full screen edit mode. A log with the previous calculations becomes available.



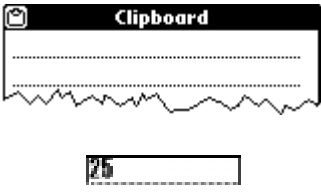
## **Editing.**

Editing in C4Finance is simple and quite similar to editing in a regular text editor for the Palm OS™ platform.

The following are standard editing examples.




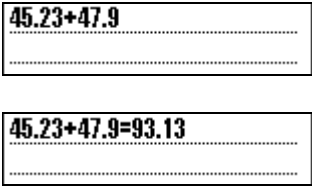
Keys/Actions:	Display:	Description:
1234+5678		Enter data
		Backspace.
9		Enter a number
		Undo
		Undo
+5679		Enter data
Move pen		Select
		Cut selected text to the clipboard
		Paste text from the clipboard
Move pen		Select 679 numbers
		Copy selected text
Tap the end of line		Move cursor
		Paste text from the clipboard
		Clear text
25		Enter data
		Clipboard addition (Notice:  →  )
		Look up clipboard content
		Close clipboard window ( )
		Clipboard subtraction ( )
		Look up clipboard content
		Clear clipboard

Keys/Actions:	Display:	Description:
  		<p>Look up clipboard content. It is empty.</p> <p>Return back to the edit field.</p>

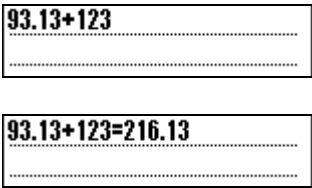
### Calculations.

Below you can find a brief introduction to C4Finance arithmetic. Calculations in C4Finance resemble handwriting on a sheet of paper. Imagine that a magic sheet of paper understands your math writing and automatically solves it. That is the way C4Finance works.


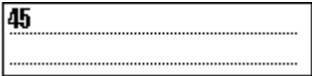

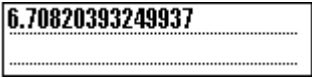
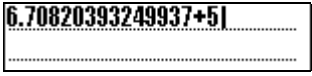

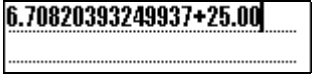
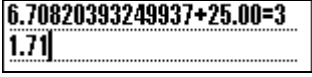
In order to calculate  $45.23 + 47.9$ :

Keys/Actions:	Display:	Description:
 $45.23 + 47.9$  $=$		<p>End of the calculation.</p>




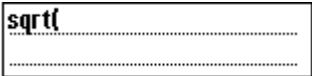

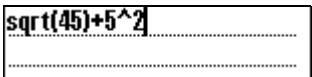
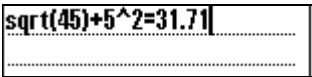
In order to perform an action with the just obtained result, you can continue entering data. In this case the left part of the previous calculation will disappear.

Keys/Actions:	Display:	Description:
$+123$  $=$		<p>End of the calculation.</p>

Another examples:  $\sqrt{45} + 5^2$

Keys/Actions:	Display:	Description:
 4 5		Square root of 45
		
+ 5		Square of 5
		
=		End of the calculation.

Calculate  $\sqrt{45} + 5^2$  using another technique, by using Function Pad.

Keys/Actions:	Display:	Description:
MENU		Choose 'Math' category if necessary.
 		Tap square root button
45 ) + 5 		End of the calculation.
=		

**The percent key.**

The % key has two functions: finding a percentage and adding or subtracting a percentage.

**Finding a Percentage.** In this case you use a '×' sign prior to the number; % divides a number by 100.

For example:

$$10 \% = 0.1$$

$$200 \times 10 \% = 20$$

**Adding or subtracting a percentage.** In this case you use plus or minus signs prior to the number. For example, to increase 200 by 10%, just enter  $200 + 10\% =$ . (Result is 220)

Tips calculations. Imagine you and your friend after dinner in a restaurant having gotten a bill of \$45. All your expenses are equal. You have decided to pay 15% tip. How much should each of you pay? What is the clear tip amount?

Keys/Actions:	Display:	Description:
<b>CLR</b>		Lets clear the edit field.
$45 + 15 \% =$		You and your friend have to pay \$51.75 .
$\div 2 =$		Each of you have to pay \$25.87
		Undo the 3 last actions.
Select '+' (between 45 and 15%)		
<b>×</b>		Change '+' to '*'
<b>=</b>		The clear 15% tip amount for \$45 is \$6.75

**Apostrophe as thousand separator. Why?**

Why does C4Finance use the apostrophe as a thousands separator? (1'000'000 vs. 1,000,000?)


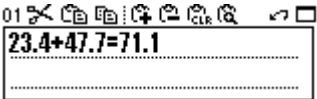

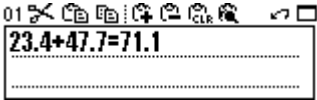

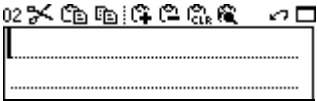

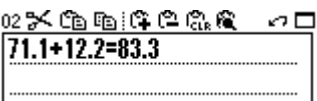

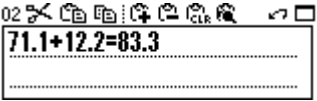

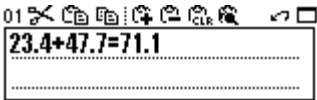

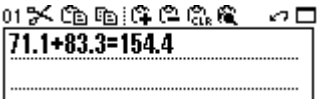
Because C4Finance allows entering functions in the edit field and these functions can have more than one argument.



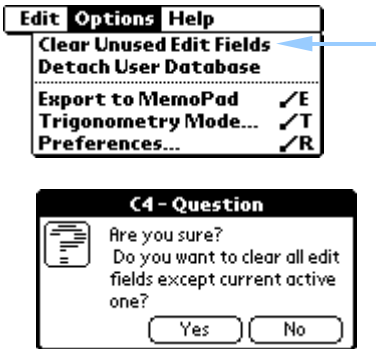
Please look at an example: "hypot(2'000, 3'000)". If you change 2'000 and 3'000 to 2,000 and 3,000 , then you modify the expression to "hypot(2,000,3,000)". It is clear that by changing the expression there are now four arguments for “hypot” instead of two. Therefore, we have to use a symbol other than comma for the thousands separator.

### Multiple edit field.



C4Finance maintains a multiple edit field scheme. It is as if you had a few calculators in your hands and were able to exchange data among them. For example, you can do some calculations on the first calculator then switch to the second calculator, make other necessary calculations then switch back to the first calculator and use the result from the second calculator. Now imagine 3, 10, or 16 calculators.

Below you can find an example of how to use two edit fields simultaneously.

Keys/Actions:	Display:	Description:
 23.4+47.7=		Do the first calculation.
		Put result (71.1) to the clipboard. Notice an edit field number at the upper left corner.
		Go to next edit field. Look at the edit field number: it is “02” now.
 + 12.2=		Do the second calculation.
		Put the second result in the clipboard.
		Go back to the previous calculations in the first edit field.
+  =		End of the calculation.  If you wish you could switch to some other edit field to do calculations and keep the data in this indicator as long as you want.

Keys/Actions:	Display:	Description:
 or  , Options→ Clear Unused Edit fields  Tap 'Yes'.		<p>You decided that you do not need all of the calculations except the currently active one and would like to clear memory.</p> <p>Confirm the deletion.</p>

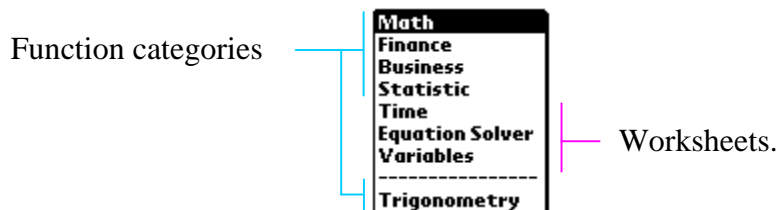
### Category Menu and Function pad.

C4Finance has two menus: category menu (MENU) and application menu ( or .

By using the application menu you get access to editing functions (copy, cut and so on) and special functions (preferences, functions reference and so on).

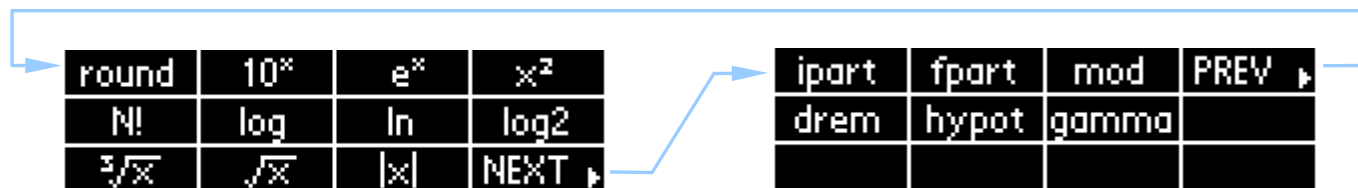
By using the category menu you get access to different function categories. For example: financial or business functions.

Let's take a look at this menu. Tap MENU button.



Choosing one of the function categories directly affects the Function pad appearance. Some of the items in the list (Time, Equation Solver and Variables) do not affect the Function pad, but will call corresponding forms (worksheets).

Here is the function pad example for the Math category.





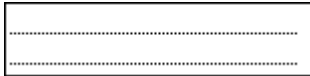
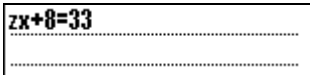
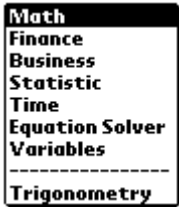
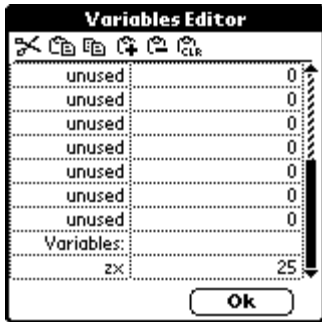
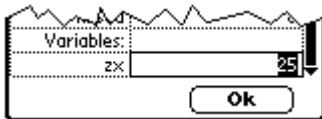
Use buttons **NEXT** and **PREV** to get the other functions of the same category.

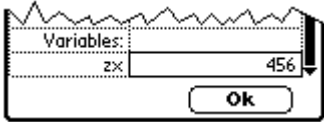
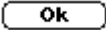


TVM	CFLO	BOND	DEPR
ICNV	BRKEY		
sppv	spfv	uspv	usfv

Buttons with capitalized letters are used to access worksheets, those with small letters to put the function name into the edit field.

### Variables.


C4Finance lets you use variables.

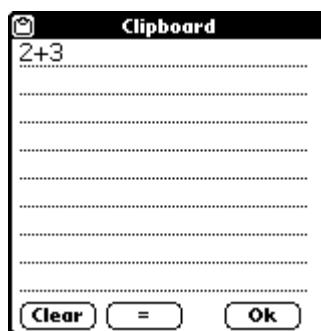
Keys/Actions:	Display:	Description:
 zx=25		Enter variable “zx” and its value
=		Variable is entered and ready to use. Field is ready to start new calculation.
zx+8=		Use stored variable.
MENU		
Tap “Variables” line and scroll the list down.		Look at “zx” variable.
Tap the ‘25’ number		


Keys/Actions:	Display:	Description:
456		Enter new number.
		Go to the main screen.
+ZX=		Use new value of 'zx' variable.

### Clipboard.

In C4Finance you can use the clipboard not just to copy and paste as a regular clipboard does, but also to do calculations inside it.

In order to perform a calculation inside the clipboard, select and copy an expression to the Palm clipboard from any worksheet or form, or from another application. Go to C4Finance Clipboard window by tapping .

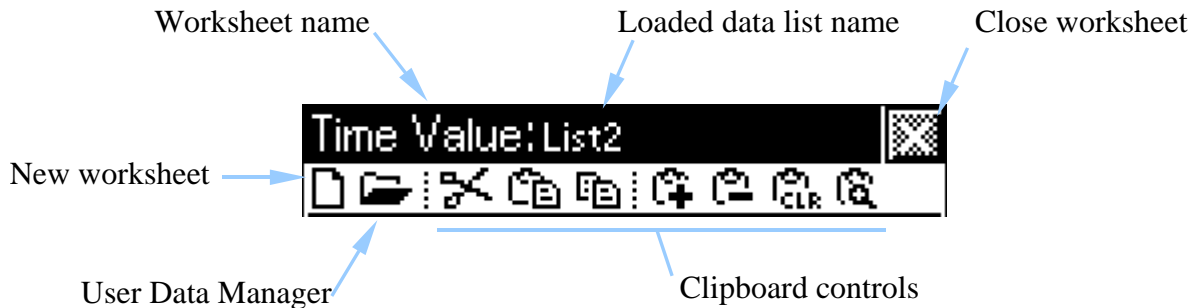


You can see, but not edit, your expression inside. Tap  to calculate it and substitute its number equivalent. Tap Ok to close the clipboard and use this number in your next computation.

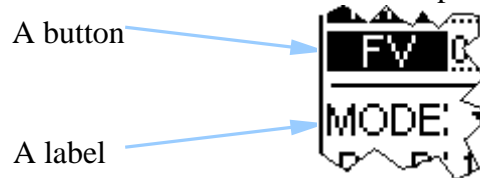
### General rules for worksheets.

1. Each worksheet has a button “Close worksheet”. See example below.
2. All the worksheets have their names at the top of the window. Some of them have names of the loaded data lists after a colon.
3. Use available clipboard controls for any field of the active worksheet.

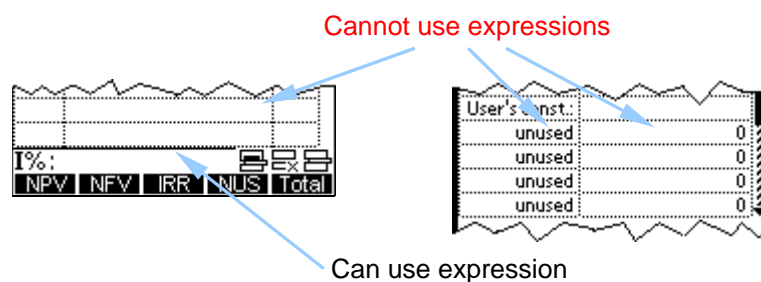




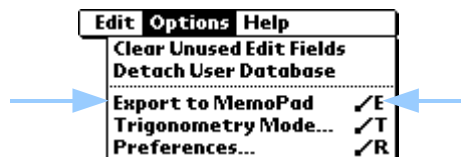
4. You can always distinguish buttons and labels. Look at the example below.



5. You can use numbers, expressions and variables in the fields of worksheets. You cannot use expressions in the table cells.



6. You can export the whole worksheet data to the MemoPad (build in application of the PalmOS™). In order to perform exporting, choose "Export to MemoPad" menu item from Options.

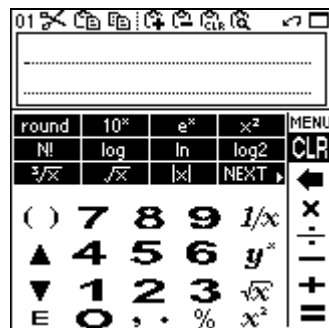


Then you need to enter a name for the new MemoPad record, press "Ok" and the record will be created.

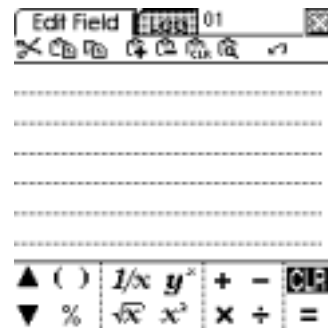
Notice, this option unavailable for Variables Editor, Equation Solver and Interest Rate Conversion worksheets.

## Maximized edit field and log.

C4Finance lets you edit long math expressions up to 255 symbols. In order to do that you can switch to the maximized edit field. Functionality of this field is absolutely the same as the edit field on the main screen, except for the function and numerical pad. You should use the Graffiti® area or the on-screen keyboard.



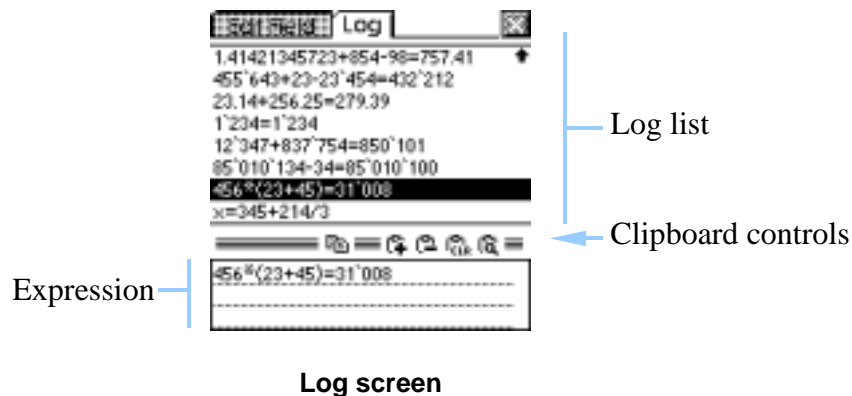
Regular screen



Maximized screen

You can go from the regular edit field to the maximized edit field by tapping '☐', to go back tap '☒' (close maximized edit field).

As you see the maximized edit field has two tabs "Edit field" and "Log". You can easily switch from the edit field to the log screen. Please notice, the maximized edit field and log screen are extended options for the regular edit field screen and when you press '☒' you always go back to the main screen and the chosen bookmark will be remembered. Next time, by tapping '☐' you will get to the screen you left (either maximized edit field or log).

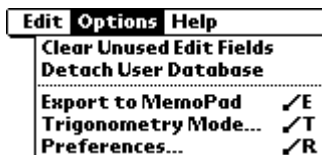


The Log screen is a very powerful instrument to look up at the calculations you have done. It keeps up to 30 solved lines (lines that contain the '=' symbol). You can choose any of the previous calculations by using the log list. Select any part of an expression (or the whole expression) and copy the selected part to the clipboard. Notice, there is no paste or cut buttons. This field is editable, but not savable.

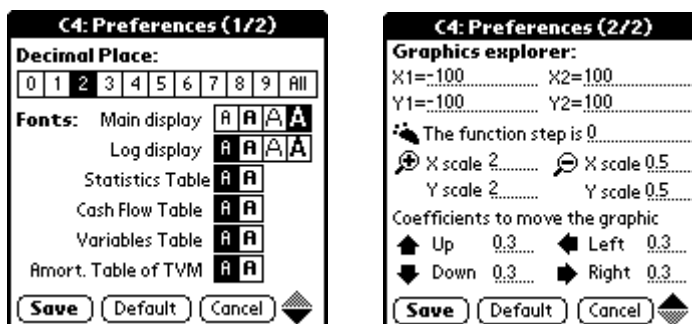
Double tapping on any item in the Log list copies it into the currently active edit field.

## Preferences.

Access to the preference panel is available via application menu “Options → Preferences...” or via shortcut “✓ R”.



Notice the preference panel has more than one page. You can go through them by using ‘◆’ keys.



Tap “Save” to save preferences and close the window or “Cancel” to leave them unchanged.

Tap “Default” to set all preferences in a default condition; in this case “Preferences” panel will not be closed.

### The first page.

“**Decimal Place**” allows you to format numbers. To change the number of displayed decimal places, choose one of the numbers (0-9). The ‘All’ option gives you an opportunity see a number as precisely as possible (up to 14 numbers).

“**Fonts**” allows you to choose fonts for some worksheets and tables. Play with these font settings and find the most convenient configuration.



### The second page.



“**Graphics explorer**” preferences let you tune its parameters.

“**X1**”, “**X2**”, “**Y1**”, “**Y2**” set default zoom of the graphical representation of a function.

“**The function step**” predefines a step size for the graphical representation of a function. The smaller step relative to X-range ( $X2 - X1$ ), the better quality of the graphics you get, the slower the graphic will be drawn; in this case number of steps will be  $\frac{X2 - X1}{step\_size}$ . If you set the function step to zero, the step will be

calculated automatically according to the screen size; in this case the number of steps is always a constant (approximately 130). Zero value is acceptable for the most common cases.

 **X scale, Y scale** are factors to increase the graphics. For example, if you set them to 2 for the X-axis scale and 3 for the Y-axis scale, and then tap '' button in Graphics Explorer, the graphic will be increased in size two times for the X-axis and three times for the Y-axis.

 **X scale, Y scale** are factors to decrease the graphics. For example, if you set them to 0.5 for X-axis scale and 0.333 for the Y-axis scale, and then tap '' button in Graphics Explorer, the graphic will be decreased in size two times ( $1/0.5$ ) for the X-axis and three times ( $1/0.333$ ) for the Y-axis.

**Coefficients to move the graphic** are similar to decreasing and increasing factors in the previous example for scales, but they are used to move graphics in some of the four directions (up, down, left and right). For example, if you set them all to 0.3, the graphic will be moved in a chosen direction by 30% (or  $1/3$ ).

## User Data Manager.

User Data Manager (UDM) is a part of the calculator that helps you manage your saved data. By using it you can find, open or delete worksheet data. It can be called from some of the worksheets by tapping '☰' key.

For example:



UDM now maintains the most bulky worksheets (Time Value of Money, Cash Flow Calculations and Statistics).

**The logic of saving your data** is a little bit different from what you are accustomed to seeing working on a PC.

1. Creating a new worksheet, you always have to define its name.
2. When you leave any current worksheet it always gets saved automatically.

It helps you switch to another task quickly.

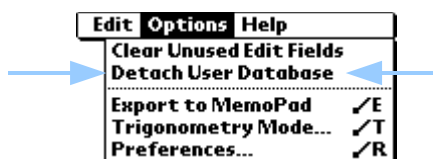
Do not be confused in the following situation. You have just created a worksheet; after that you open UDM and do not see the worksheet name there. Why? It happens because the worksheet has not been saved yet. It will get saved later when you leave the worksheet.

### Special futures.

C4Finance license let you use C4Everyday calculator as well. Notice C4Finance Professional users get C4Everyday Engineer; C4Finance Standard get C4Everyday Personal. C4Everyday give you the same service, except financial and business worksheets.

You can use C4Finance data (your worksheets, preferences, License) with C4Everyday. The following steps have to be performed.

1. Tap "Detach User Database" menu item from Options.



2. Exit from C4Finance (you can uninstall C4Finance).
3. Start C4Everyday (or C4Finance again) and the database will be attached automatically.

The same steps you have to perform in C4Everyday, to use the database with C4Finance again.

## Math.

---

No complex numbers and lists are supported.  
Choose 'Math' from the category menu.

round	10 <sup>x</sup>	e <sup>x</sup>	x <sup>2</sup>
N!	log	ln	log2
$\sqrt[3]{x}$	$\sqrt{x}$	x	NEXT ▶
ipart	fpart	mod	PREV ◀
drem	hypot	gamma	

Functions you can use:

**+**, **-**, **x**, **÷**

Addition, subtraction, multiplication and division with real numbers.  
Use '-' (minus) before a number to make it negative.

**-2+3=1.00**

**y<sup>x</sup>**, **x<sup>2</sup>**,  **$\sqrt{x}$** ,  **$\sqrt{x}$** , **sqrt(x)**,  **$\sqrt[3]{x}$** , **cbrt(x)**.

Power, square, square root and cube root with real numbers.

**1/x**, **recip(x)**

Inverse or reciprocal function with real numbers.

**recip(5)=0.20**

**10<sup>x</sup>**, **log**, **log(x)**, **ln**, **ln(x)**, **log2**, **log2(x)**

Power of 10, base 10 logarithm (log), natural logarithm (ln) and base 2 logarithm (log2) with real numbers.

**e<sup>x</sup>**, **exp(x)**

Exponential function of x,  $e^x$ .

**exp(2+3)=148.41**

**|x|**, **abs(x)**

Absolute value of x.

**N!**, **x!**

Factorial of x. You can use factorial with positive real numbers.

**round**, **round(x)**

Round x to nearest integer value away from zero.

**mod**, **mod(x,y)**

Modulo remainder of x/y. You can use real numbers for both x and y values.

**drem**, **drem(x,y)**

Reminder of x/y. You can use real numbers for both x and y values.

**hypot**, **hypot(x,y)**Hypotenuse of right triangle. ( $\sqrt{x^2 + y^2}$ )**gamma**, **gamma(x)**Returns gamma function value of x. ( $\Gamma(x)$ )**ipart**, **ipart(x)**, **fpart**, **fpart(x)**Integer ( **ipart(x)** ) or fractional ( **fpart(x)** ) part of real x.**ipart(2.6)=2.00****fpart(2.6)=0.60**

## Financial calculations.

---

Choose 'Finance' in the category menu.

TVM	CFLO	BOND	DEPR
ICNV	BRKEV		
sppv	spfv	uspv	usfv

### *Time Value of Money.*

#### **TVM**

Time value of money (TVM) calculations are calculations based on money earning interest over a period of time. This worksheet lets you do TVM calculations with simple and compound interest.

**Simple interest.** Interest earned only on the original principal amount invested.

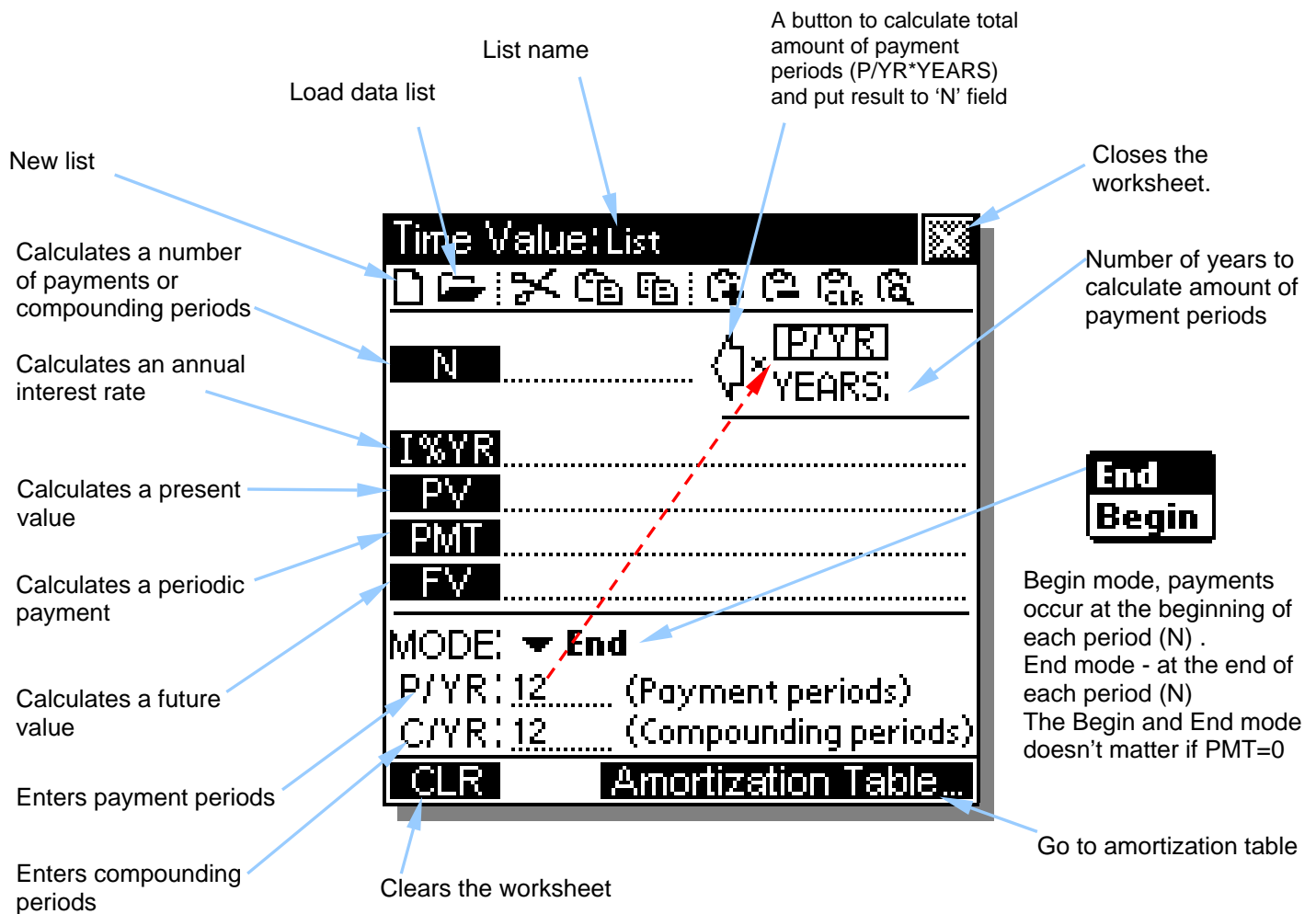
**Compound interest.** Interest earned on both the initial principal and the interest reinvested from the prior periods.

#### **A TVM worksheet lets you calculate:**

- Future Value. The amount an investment is worth after one or more periods.
- Present Value. The current value of future cash flows discounted at an appropriate discount rate.
- The dollar amount of each periodic payment.
- The nominal annual interest rate as a percentage.
- Total number of payments or compounding periods.
- Amortization schedule.




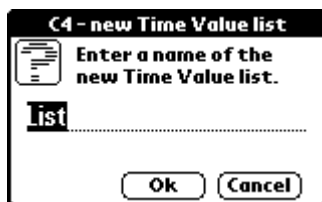
## Time Value of Money worksheet.



N, I%YR, PV, PMT, FV are labels of the corresponding fields and buttons to compute the result.

## Create new Time Value of Money list.

In order to create a new data list you have to tap the “new list” button. (‘’). You will be asked for a name for the new list of data.




Enter a name, up to 11 symbols.

Your current data list will be saved automatically. If you do not need it, go to “User Data Manager” and delete it.

When you start the TVM worksheet for the first time after installation, you should define a name of the first data list before it starts.

### ***Load existing worksheet.***

In order to load an existing data list tap the “User Data Manager” button (‘’). Choose the name you need and tap the “Open” button. The list will be loaded.

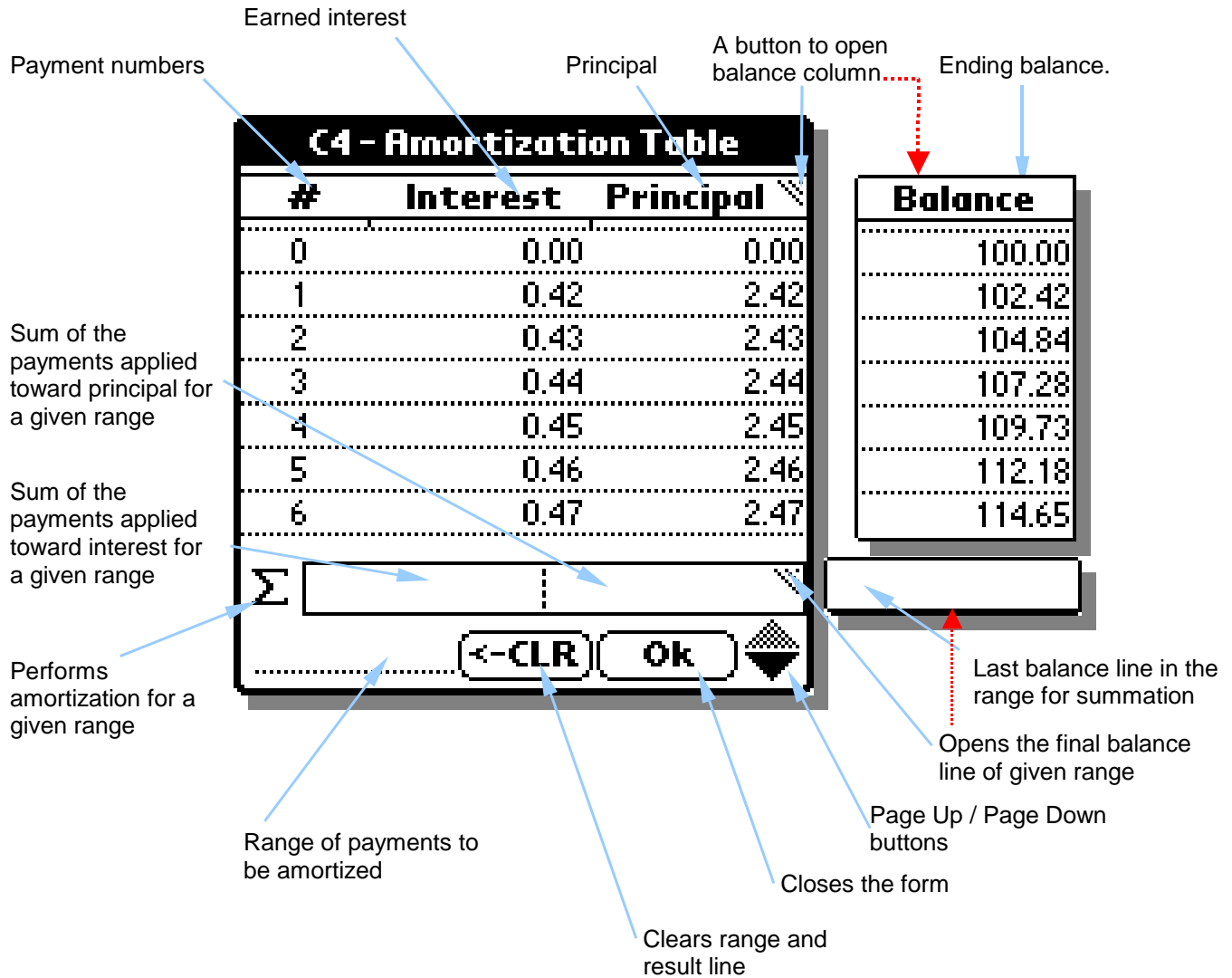
### ***Calculations.***

1. Prior to any calculation check the options that define calculation parameters (MODE, P/YR, C/YR). Set them according to the needs of your problem.
2. Fill out all of the fields except unknown one.
3. Tap the button with the unknown variable and the result will appear in the corresponding field.

### ***Amortization table.***

Amortization table shows and prints the following values:

- Payment numbers
- The amount of the payments applied toward interest
- The amount of the payments applied toward principal
- The balances after each payment has been made




Note. Because of the limited screen size the balance column is hidden. To see it tap  button.

C4 - Amortization Table		
#	Interest	Balance
0	0.00	100.00
1	0.42	102.42
2	0.43	104.84
3	0.44	107.28
4	0.45	109.73
5	0.46	112.18
6	0.47	114.65
$\Sigma$		
<div> <div>&lt;-CLR</div> <div>Ok</div> <div></div> </div>		

In order to get an amortization schedule for many payments, enter the range of payments to be amortized. A space symbol is the separator between these two numbers. (For example: "2 10") After that tap the  $\Sigma$  button.



In order to see the final balance for a given range, tap  button.

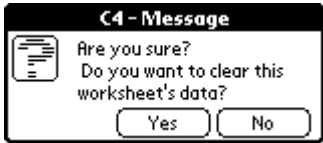
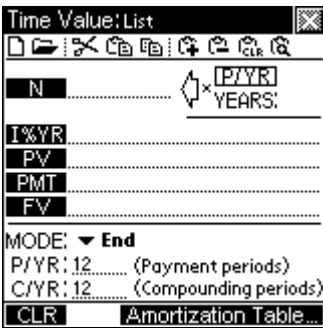






Tap “←CLR” button if you want to clear the range and result line.

### Examples.

#### A Car Loan.

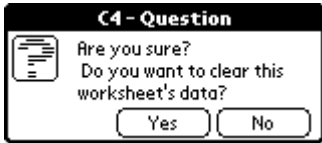
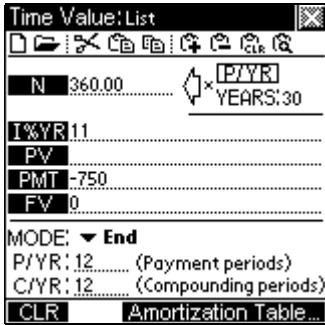
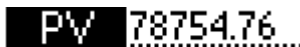
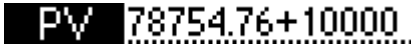


You are going to buy a new car and your auto dealer has offered you a 5-year loan at 9.5% annual interest, compounded monthly. The car price is \$24,500 and your down payment is \$5,000. Your payments start at the end of the first month after the purchase. What will be your monthly payments?

Keys/Actions:	Display:	Description:
Tap ‘ <b>CLR</b> ’	 	<p>Clears the worksheet and sets default values</p> <p>Lets start with clear worksheet.</p>
MODE: End P/YR: 12 C/YR: 12	<p>MODE: ▼ End</p> <p>P/YR: 12.....</p> <p>C/YR: 12.....</p>	Loan payments at the end of each month, 12 payment per year
YEARS: 5	<p>Y<sup>00</sup> YEARS: 5</p>	5-year loan
	<p>N 60.00.....</p>	Number of payments 5*12=60
I%YR: 9.5	<p>I%YR 9.5.....</p>	9.5% annual interest rate

Keys/Actions:	Display:	Description:
PV: 24500-5000		Loan amount
		Your monthly payment for this loan.

### A Home Mortgage.

You would like to buy a house and after consideration of your personal finances you have decided that you can afford \$750 to spend each month on a 30-year mortgage. Also, you can afford a \$10,000 down payment. Annual interest rate is 11%. What is the maximum house purchase price you can afford? Calculate the amount of the second year's payments for loan that are applied toward interest and principal.

Keys/Actions:	Display:	Description:
Tap 'CLR' and then confirm the request by tapping 'Yes'.		Clears the worksheet and set default values
Fill out the worksheet according to the problem.		
Tap 'PV'		Calculate loan amount.
+10000		Loan plus down payment is the total price of the house.
Select the whole line and tap 'C'		Copy selected symbols to the clipboard
Go to the clipboard by tapping 'C' and finish the calculation. Tap '='		You can afford \$88,754.75 house purchase price. This is the first answer.

Tap 'Ok' and go back to TVM worksheet.

Leave the loan amount 78754.76 in the PV field (select and delete "+10000" part of expression)

Tap 'Amortization Table...'.  


Enter '13 24' end tap 'Σ'.

PV 78754.76

C4 - Amortization Table		
#	Interest	Principal
0	0	0
1	-721.92	-28.08
2	-721.66	-28.34
3	-721.4	-28.6
4	-721.14	-28.86
5	-720.87	-29.13
6	-720.61	-29.39
Σ		

Go to amortization table

6	20.1	-29.39
Σ	-8'604.49	-395.51
13 24		

The answers

Amount of the second year (from 13 to 24 months) payments: interest and principal.

## Cash Flow Calculations.

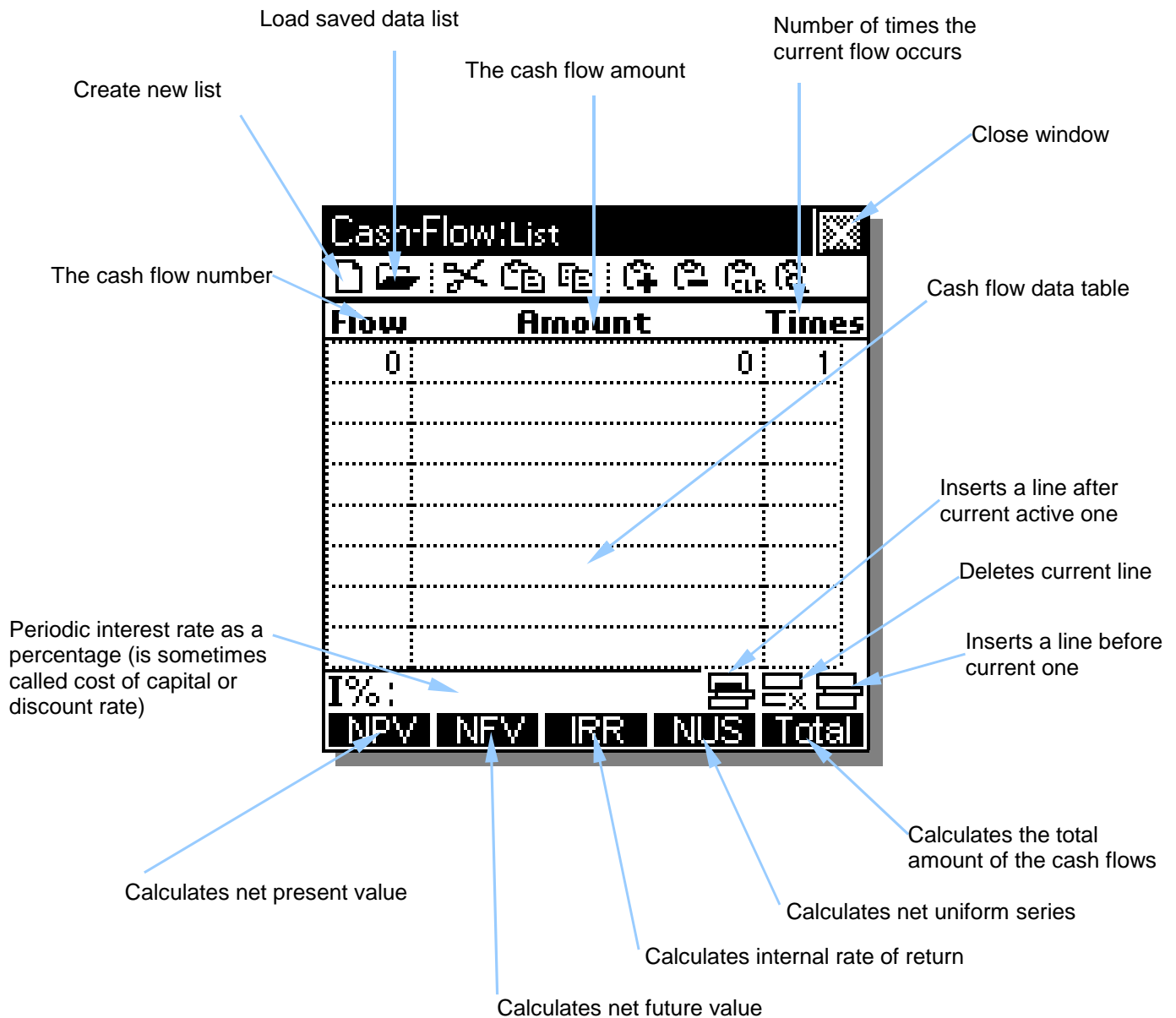
### CFLO

The Cash Flow worksheet stores and analyzes the value of payments over equal periods of time. You can enter either equal or unequal cash flows, which can be cash inflows or outflows.


#### A Cash Flow worksheet lets you calculate:

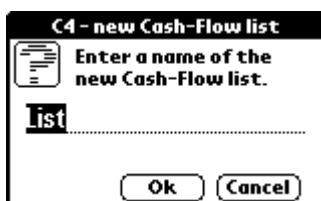
- Net present value (NPV)
- Net Future Value (NFV)
- Internal Rate of Return (IRR)
- Net Uniform Series (NUS)
- The total amount of the cash flows (Total)

## Cash Flow worksheet.



## Creating a Cash Flow list.

In order to create a new data list you have to tap the “new list” button. ( ‘’ ). You will be asked a name for the new list.




Enter a name, up to 11 symbols.

Your current list will be saved automatically. If you do not need it, go to “User Data Manager” and delete it.

When you start the Cash Flow worksheet for the first time after installation, you should define a name of the first data list before it starts.


### ***Load existing worksheet.***

In order to load an existing worksheet tap the “User Data Manager” button (‘’). Choose the name you need and tap the “Open” button. The list will be loaded.

### ***Calculations.***

1. Fill in the cash flow data table.
2. Enter a periodic interest rate **I%**
3. Tap the button corresponding to the calculation you want (‘**NPV**’ **NPV**’ **IRR**’ **NLS**’ **Total**’) and the result will appear in the pop up window.

### ***Entering Cash Flows.***

In order to enter a cash flow you just need to fill in the table. Initially (when you just created a list) the table has one line only (flow 0). The ‘Flow 0’ is an initial flow (often it is negative). You cannot edit the ‘Times’ value for the ‘Flow 0’; this value must always be “1”. Tap ‘’ button in order to add a new line in the table. Pay attention to the sign (positive or negative) of cash flow amount figures. Positive figures in the worksheet are considered as inflows, negative figures are outflows. ‘Times’ is the number of consecutive occurrences of the current flow.

After entering data into the cash flow table, enter a periodic interest rate; it can be a number or an expression.

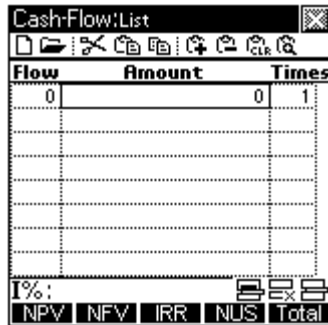
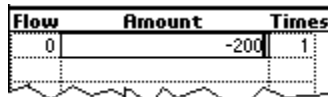
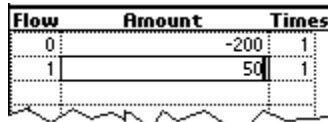
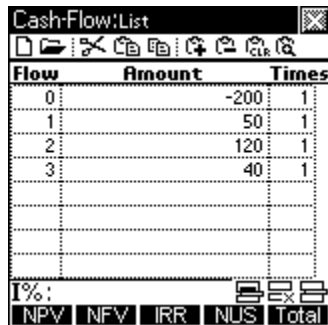
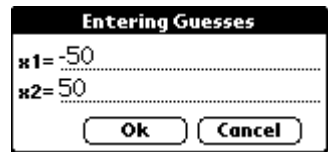
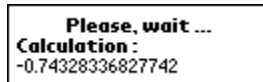

### ***Examples.***

#### **IRR.**

Find the internal rate of return for a given cash flow:

<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>
-200	50	120	40

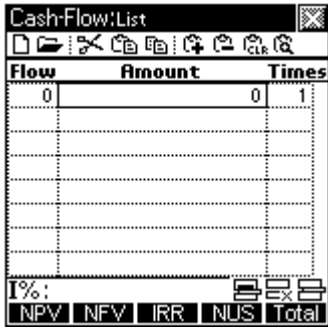
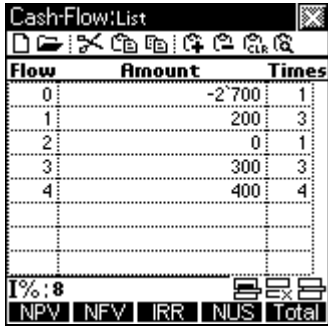
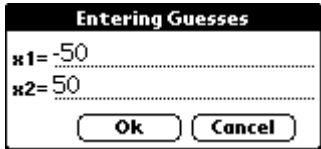





Keys/Actions:	Display:	Description:
Tap '□' if you need to create a new empty list.		Let's start with a clear list.
Tap the first line in "Amount" column and enter an amount "-200"		Enters an initial value
Tap '≡' and enter an amount "50" in a new line		Enters the first cash flow.
Enter the rest.		Final look of the worksheet.
Tap 'IRR' button		Enter your guess for IRR as a percentage. In this case you guess that IRR value can be between -50% and 50%. 'x1' is the smallest value of your guess, 'x2' is the largest value.
Tap 'Ok' button to start the calculation.		Performing the calculation.
		View the result. Appearance of the calculated answer depends on number of digits selected in Preferences.

### An Investment with Grouped Cash Flows.

You are considering an investment that requires a cash outlay of \$2700, with the promise of monthly cash flows as shown. Annual interest rate is 8%. Find IRR, NPV and NFV.

0	1	2	3	4	5	6	7	8	9	10	11
-2700	200	200	200	0	300	300	300	400	400	400	400

Keys/Actions:	Display:	Description:
<p>Tap '□' if you need to create a new empty list. You can clear the current list by tapping the '≡' key 2 times when the table does not have the cursor in any cells (tap I% field).</p> <p>Enter the given cash flows.</p> <p>Tap 'IRR' button.</p> <p>Tap 'Ok' to start the calculation and see the result</p> <p>Tap 'NPV' button, to start the calculation</p>	    	<p>Let's start with a new list.</p> <p>Enter your guesses for IRR as a percentage. In this case you guess that the IRR value can be between -50% and 50%. 'x1' is the smallest value of your guess, 'x2' is the largest value.</p> <p>IRR value, tap 'Ok' to return.</p> <p>NPV value, tap 'Ok' to return.</p>

Keys/Actions:	Display:	Description:
Tap 'NfV' button, to start the calculation		NfV value, tap 'Ok' to return.

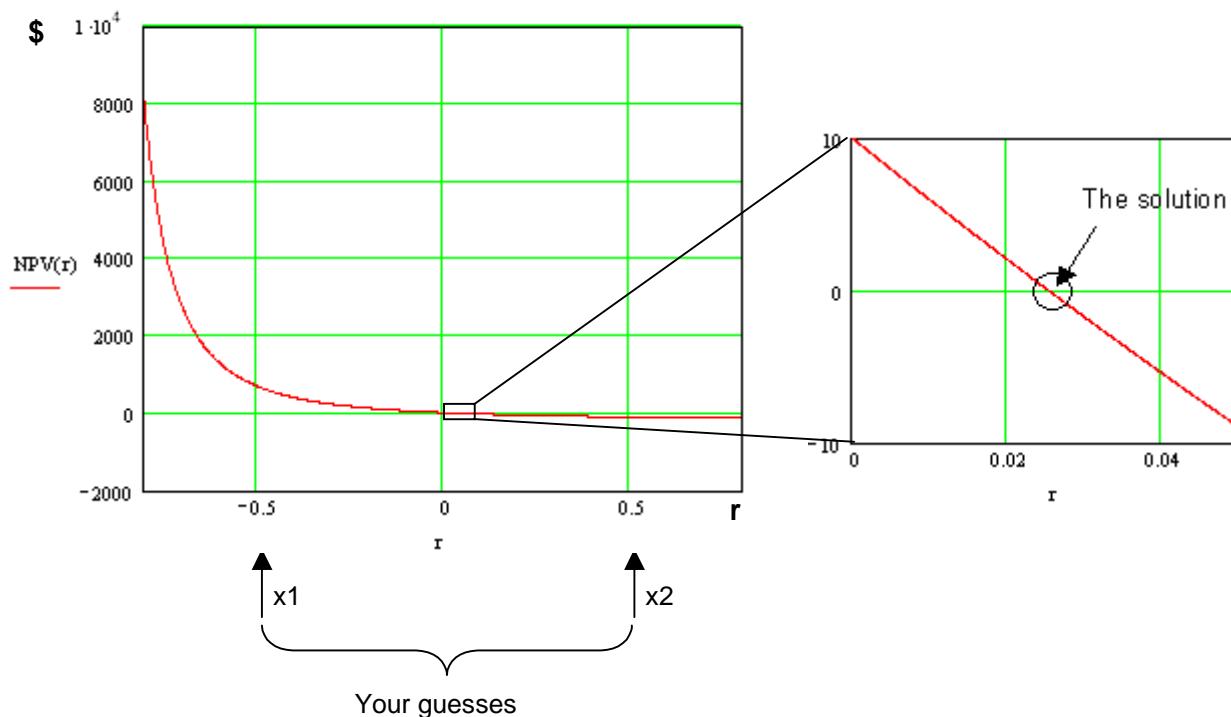
**Theory.**

The calculator, in the case of IRR, solves an equation by using trial and error method.

$$NPV(r) = CF_0 + \sum_{i=1}^N \frac{CF_i}{(1+r)^i}; \text{ where } NPV(r) = 0$$

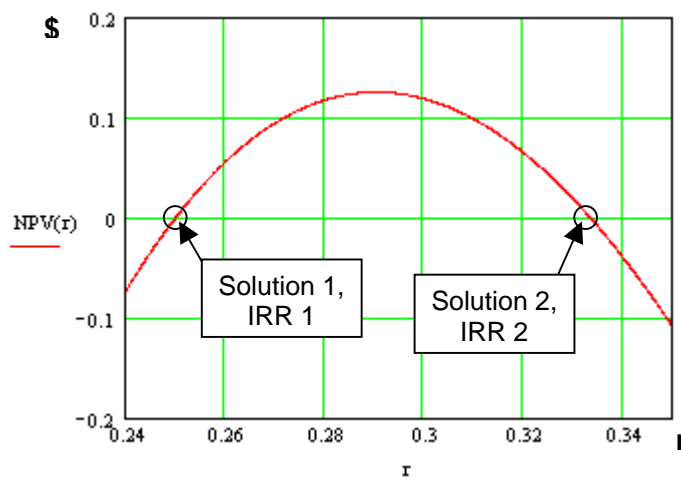
The solution of the equation is at a point where the net present value profile intersects the 'r' axis. Look at the pictures below; this is the NPV profile for the previous example.

$$NPV(r) := CF_0 + \sum_{i=1}^N \frac{CF_i}{(1+r)^i}$$

**Why do I need to enter guesses?**

C4Finance lets you solve multiple rate of return problems. You can find a solution for any given range.

For example the following cash flow has two IRRs.



Flow	Amount	Times
0	-120	1
1	310	1
2	-200	1

You can find them by entering guesses:  $x_1=0$ ,  $x_2=30$  for the first solution,  $x_1=30$ ,  $x_2=100$  for the second solution.

## Bond.

### BOND

A Bond worksheet lets you calculate:

- Yield to maturity or yield to call date as an annual percentage (Yield%)
- Price of the bond per \$100 face value (Price)
- Interest accrued from the last coupon-payment date (Accrued)
- Call price per \$100 face value (Call price)
- Annual coupon rate as a percentage (Coupon%)

**Bond worksheet.**

The screenshot shows the 'Bond Calculation' worksheet with the following fields and buttons:

- Buttons at the top:** A row of icons for various functions: a calculator, a document, a list, a currency symbol, a percentage symbol, a date icon, and a bond icon.
- Settlement:** 3/12/01 Mon
- Maturity:** 3/12/02 Tue
- Coupon %:** 0
- Call price:** 100
- Yield %:** 0
- Price:** 0
- Accrued:** 0
- Calendar basis:** 30/360
- Interest period:** Semi-Annual
- CLR:** A button at the bottom.

Annotations with arrows point to the following elements:

- Enters settlement date:** Points to the Settlement field.
- Enters maturity date:** Points to the Maturity field.
- Enters or calculates coupon rate as an annual percentage:** Points to the Coupon % field.
- Enters or calculates call price per \$100 face value:** Points to the Call price field.
- Enters or calculates yield to maturity as an annual percentage:** Points to the Yield % field.
- Enters or calculates the price per \$100 face value:** Points to the Price field.
- Calculates the interest accrued from the last coupon-payment date until the settlement date, per \$100 face value:** Points to the Accrued field.
- Closes the worksheet:** Points to the top-right corner icon.
- Clears the worksheet (set default values):** Points to the CLR button.

Two callout boxes on the right show the results of calculations:

- Actual 30/360:** A box showing the result of the Actual 30/360 calculation.
- Annual Semi-Annual:** A box showing the result of the Annual Semi-Annual calculation.

**Calculations.**

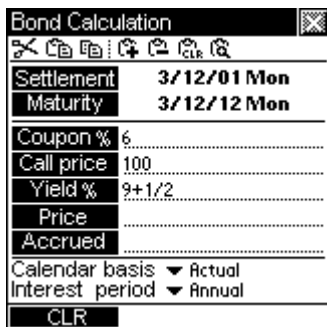
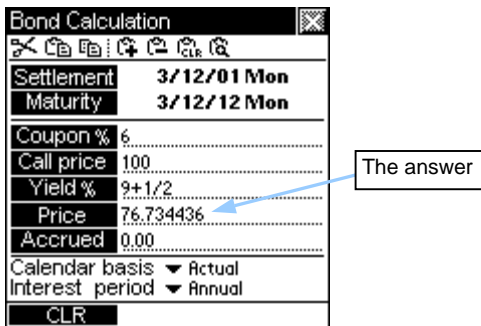
1. Prior to any calculation check the options that define calculation parameters (Calendar basis and interest period). Set them according to the needs of your problem.
2. Fill out all of the fields except unknown ones.
3. Tap the button with the unknown variable and the result will appear in the corresponding field.

Remember that “Call Price”, “Price” and “Accrued” are expressed per \$100 face value or as a percentage.

**Examples.**

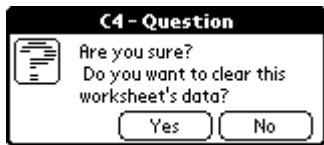
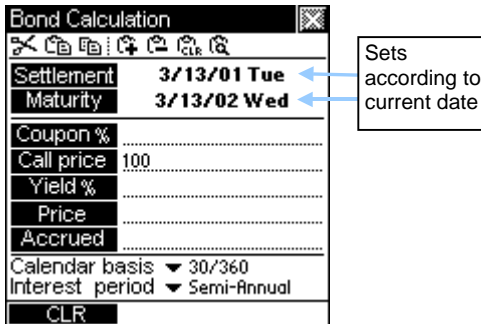
**Bond Price.** TXP Inc. has 6% coupon bonds on the market that mature on March 12, 2012. The bonds make annual payments. If yield to maturity on these bonds is  $9\frac{1}{2}\%$ , what is the current bond price on March 12, 2001.




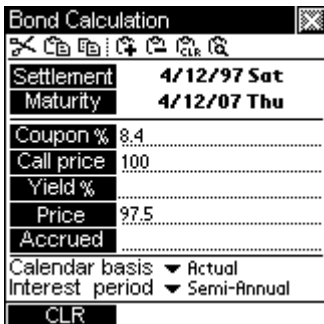
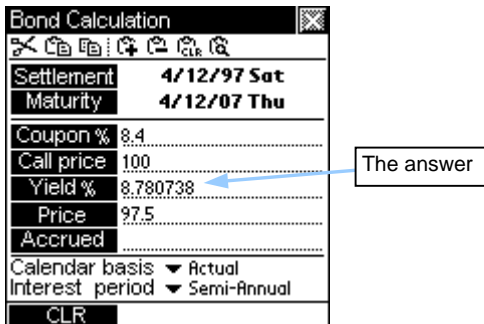


Keys/Actions:	Display:	Description:
<p>Fill out the worksheet according to the problem. Do not forget about “Calendar basis” and “Interest period”</p> <p>Tap ‘<b>Price</b>’ button.</p>	 	<p>The answer is 76.734436 or \$767.34</p>

### Bond Yield.

Furst Co. issued 12-year bonds on April 12, 1995 at a coupon rate of 8.4 percent. Suppose today is April 12, 1997. The bonds make semiannual payments. If these bonds currently sell for 97.5 percent of the par value, what is the YTM?

Keys/Actions:	Display:	Description:
<p>Tap ‘<b>CLR</b>’ to clear the current list and then confirm the request by tapping ‘Yes’.</p>	 	<p>Let's start with a clear worksheet.</p>

Keys/Actions:	Display:	Description:
<p>Go to the application menu (Options → Preferences...) and set Decimal Place to 6, then tap “Save”</p> <p>Tap ‘<b>Settlement</b>’ button or tap the date (‘<b>3/13/01 Tue</b>’).</p> <p>Tap ‘<b>Maturity</b>’ button or tap the date (‘<b>3/13/02 Wed</b>’)</p> <p>Fill out the worksheet according to the problem. Do not forget about “Calendar basis” and “Interest period”</p> <p>Tap ‘<b>Yield %</b>’ button.</p>	    	<p>Sets settlement date</p> <p>Sets maturity date.</p> <p>The answer is 8.780738 or 8.78%</p>



## Depreciation.

### DEPR

The Depreciation worksheet calculates depreciation values, remaining depreciable values and remaining book values one year at time. The following methods are available:

- **Straight line**
- **Declining balance**
- **Sum-of-the-years' digits**

**Accelerated Cost Recovery System** is available without this worksheet (see example below).

### Depreciation worksheet.

The screenshot shows the 'Depreciation' worksheet interface. It includes a title bar, a menu bar, and a main input area. To the right, there is a dropdown menu for the depreciation method, currently set to 'SL'. Below the input area, there is an 'Answers' area showing calculated values. At the bottom, there are buttons for 'CLR' (clear) and '=' (solve).

**Annotations:**

- Enters the depreciable cost basis of the asset at acquisition:** Points to the 'BASIS' field.
- Enters the salvage value of the asset at the end of its life:** Points to the 'SALV' field.
- Enters useful life of the asset:** Points to the 'LIFE' field.
- Enters the DB factor as a percentage of the straight line rate:** Points to the 'FACT%' field.
- Months left in the first depreciated year:** Points to the 'LFDY' field.
- Enters number of the year for which to calculate depreciation:** Points to the 'YEAR#' field.
- Shows depreciation value:** Points to the 'DEPR' field.
- Shows remaining depreciable value:** Points to the 'RDV' field.
- Shows remaining book value:** Points to the 'BOOK' field.
- Closes the worksheet:** Points to the 'X' button in the top right corner.
- Input data area:** Points to the input fields for BASIS, SALV, LIFE, FACT%, LFDY, and YEAR#.
- Answers' area:** Points to the output fields for DEPR, RDV, and BOOK.
- Solve:** Points to the '=' button.
- Clears the worksheet and sets default values:** Points to the 'CLR' button.

**LFDY** is **Length of the First Depreciation Year** (in months) or months left in the first depreciated year. For example if some assets are in service from August 1, the LFDY will be 5; 12 (month in a year) – 7 (the beginning of August).

Months:											
1	2	3	4	5	6	7	8	9	10	11	12
January	February	March	April	May	June	July	August	September	October	November	December

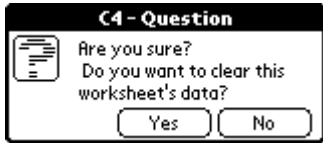
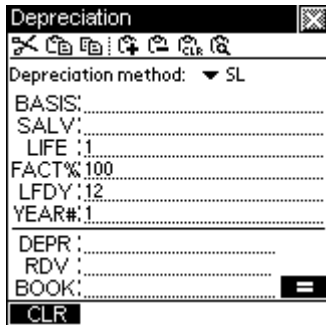

### Calculations

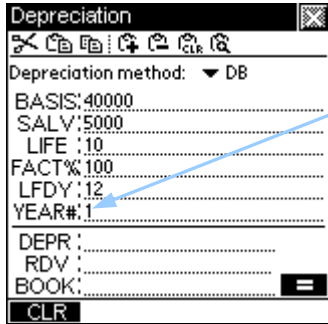
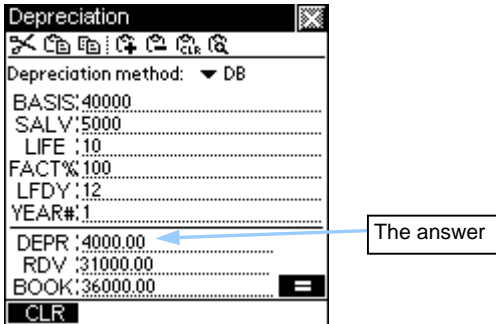
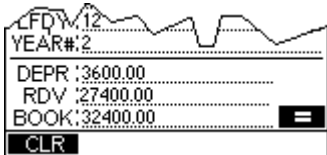


1. Choose a depreciation method from the pop-up menu.
2. Fill out all of the fields in the input data area. (Answer's area is not editable)
3. Tap '**=**' button, to get the answer: depreciation, remaining depreciable and remaining book value.

### Examples

#### Declining-Balance Depreciation.

A truck, purchased for \$40,000, is to be depreciated over 10 years. At the end of its service life the salvage value is estimated at \$5,000. Find the depreciation, remaining depreciable value and book value of the third year and sum of the depreciation values up to this year.

Keys/Actions:	Display:	Description:
<p>Tap '<b>CLR</b>' to clear the current list and then confirm the request by tapping 'Yes'.</p> <p>Tap '<b>CLR</b>' to clear the clipboard.</p> <p>Go to the application menu (Options → Preferences...) and set Decimal Place to 2, then tap 'Save' button.</p>	  	<p>Let's start with a clear worksheet.</p>

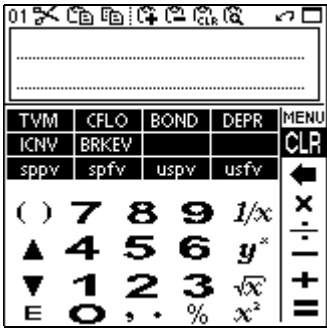
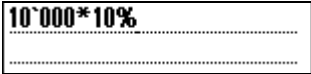
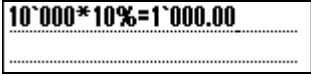


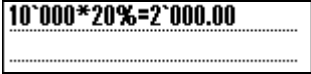


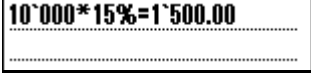
Keys/Actions:	Display:	Description:
Fill out the worksheet according to the problem.		Notice, this form is ready to start calculation for the first year only.
Tap '=' to perform the calculation.		Get depreciation value for the first year.
Tap "4000.00" value at DEPR field and then tap '📋'.	DEPR : 4000.00	Put the first year depreciation value to the clipboard.
Enter at "YEARS#" field "2" and tap '='.		Get depreciation value for the second year (3,600).
Tap "3600.00" value at DEPR field and then tap '📋'.	DEPR : 3600.00	Add the second year depreciation value to the clipboard.
Enter at "YEARS#" field "3" and tap '='.		Get depreciation value, remaining depreciable value and book value of the third year.
Tap "3240.00" value at DEPR field and then tap '📋'.	DEPR : 3240.00	Add the third year depreciation value to the clipboard.
Tap '📋'.		Sum of the depreciation values for the three years.

**ACRS deduction.**

By using the ACRS method, find the income tax deduction for a \$10,000 asset over 3 years of a 6-year life. Take into account the following hypothetical ACRS table:

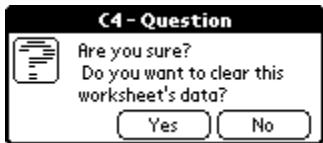


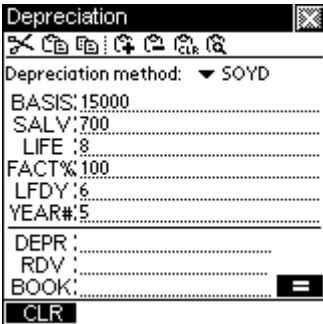
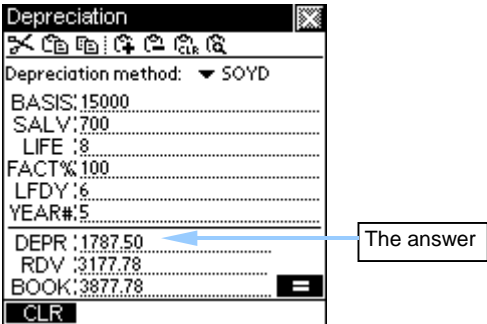
Year	Percentage Deductible
1	10
2	20
3	15
4	15
5	20
6	20

You will not find support for the ACRS method in the C4Finance Depreciation worksheet. In order to work with ACRS problems go to the main screen.

Keys/Actions:	Display:	Description:
Go to the main screen, tap 'CLR' if you need to clear the edit field.		
10000*10%		Enter basis and percentage deductible of year 1.
Tap '='		Deduction in the first year.
		
*20% =		Deduction in the second year.
		
*15% =		Deduction in the third year.

### Partial-Year Depreciation.

An industrial network server bought for \$15,000 has a useful life of 8 years with a salvage value of \$700. Using the SOYD method, find the amount of the depreciation for the fifth year. The first depreciation year was 6 month long.

Keys/Actions:	Display:	Description:
<p>Tap 'CLR' to clear current list and then confirm the request by tapping 'Yes'.</p> <p>Tap 'CLR' to clear the clipboard.</p> <p>Go to the application menu (Options → Preferences...) and set Decimal Place to 2, then tap 'Save' button.</p> <p>Fill out the worksheet according to the problem.</p> <p>Tap '=' to perform the calculation.</p>	    	<p>Let's start with clear worksheet.</p> <p>Depreciation value for the fifth year is \$1787.50.</p>

## Interest rate conversion.

### ICNV

The interest rate conversion worksheet converts between nominal and effective interest rates. The conversion is performed by using one of the following:

- Periodic compounding
- Continuous compounding

### Interest rate conversion worksheet.

Compounding

**Periodic**  
**Continuous**

Calculates nominal  
interest rate

Calculates effective  
interest rate

Calculates number of  
compounding periods  
per year.

**Interest Rate Conversion**

✂️ 📄 📅 📈 📉 📊

▼ **Periodic** **compounding**

**Nominal%** .....

**Effective%** .....

**Periods** .....

**Ok**

Enters or shows  
nominal interest rate

Enter or shows  
effective interest rate

Enters or shows  
number of  
compounding periods  
per year.

Closes the worksheet

The look of the worksheet can change. It depends on what compounding you have chosen.

### Calculations.

1. Choose compounding.
2. Enter all variables except one.
3. Tap the button with the unknown variable.

### Example.

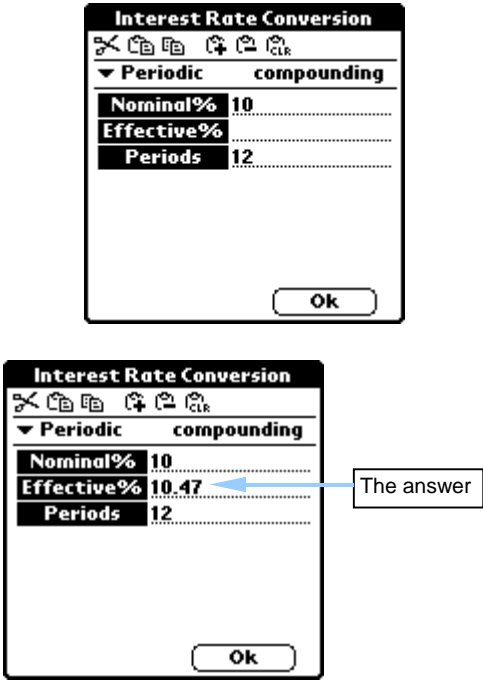
#### Converting from a nominal to an effective interest rate.

You are considering two investments.

The first promises you 10.3% effective interest rate.

The second promises you 10% annual interest, compounded monthly.

Which investment is the most attractive?

Keys/Actions:	Display:	Description:
<p>Fill out the worksheet according to the problem.</p> <p>Tap <b>Effective%</b></p>		<p>You have to compare 10.3% effective interest rate with 10% nominal interest compounded monthly. So let's convert the nominal rate to the effective rate.</p> <p>The answer is 10.47%. Therefore the second investment is more attractive than the first one.</p>

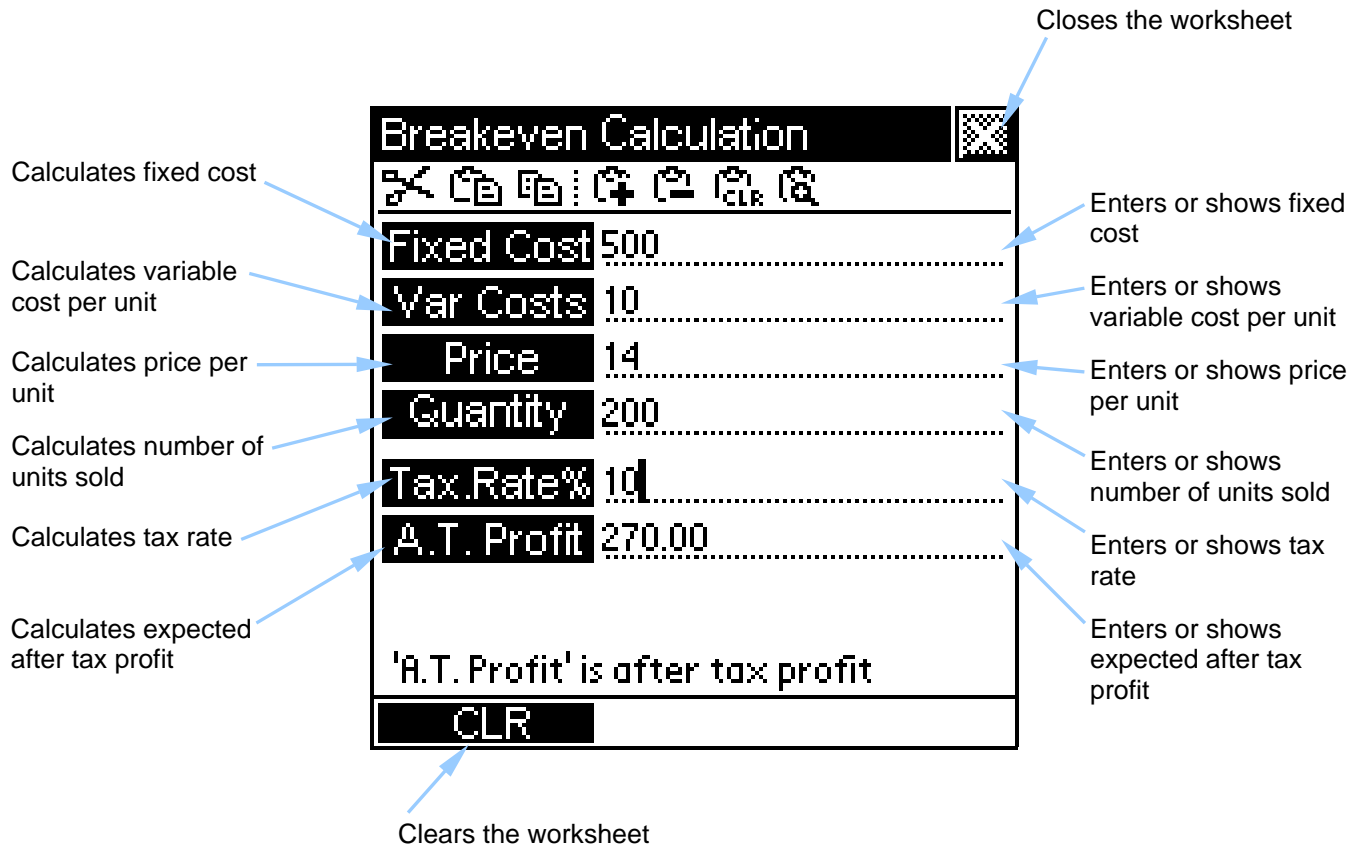
### ***Breakeven.***

#### **BRKEV**

Breakeven is the sales level that results in zero project net income (NPV or operating cash flow).

**The breakeven worksheet let you calculate:**

- Expected profit
- Required quantity
- A unit price
- Variable cost
- Fixed cost

**Breakeven worksheet.****Calculations.**


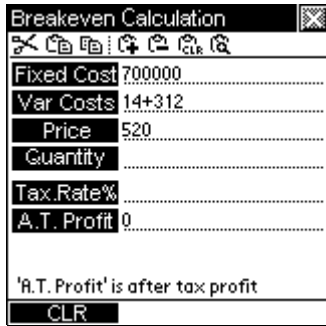
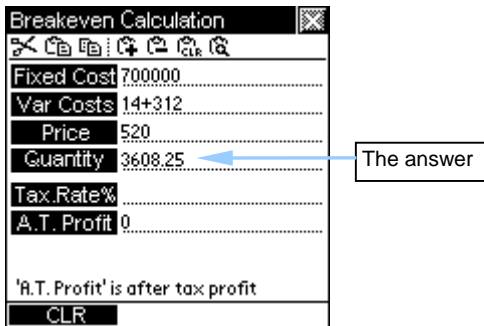
1. Enter all variables except one.
2. Tap the button with the unknown variable to get the answer.

**Example.****Required Quantity.**

Factory management is considering purchasing a new robotic line to start production. The implementation cost is \$700,000. Maintenance cost for this line is \$14 for each unit it produces. Cost of raw materials for each unit is \$312 for this line. Wholesale price of each unit is \$520. How many units should the factory sell to cover its cost for the new robotic line?

Keys/Actions:	Display:	Description:
Tap 'CLR' to clear current list and then confirm the request by tapping 'Yes'.		



Keys/Actions:	Display:	Description:
<p>Go to the application menu (Options → Preferences...) and set Decimal Place to 2, then tap 'Save' button</p> <p>Fill out the worksheet according to the problem. Notice that A.T. Profit is set to 0 to achieve the result.</p> <p>Tap 'Quantity'</p>	  	<p>The answer is 3,608.25 or 3609 units the factory should sell to cover its cost.</p>

## Acturial Functions

### Single Payment Present Value.

**sppv**

Present value of \$1 due at the end of  $n$  periods.

$$\text{sppv}(i\%, n) = \left(1 + \frac{i\%}{100}\right)^{-n}$$

$i\%$  - periodic interest rate, as a percentage;

$n$  – number of compounding periods.

It also calls  $\text{PVIF}_{i,n}$

*Example:*  $\text{sppv}(2,10)=0.82035$

### Single Payment Future Value.

**spfv**

Future value of \$1 at the end of  $n$  periods.

$$\text{spfv}(i\%, n) = \left(1 + \frac{i\%}{100}\right)^n$$

$i\%$  - periodic interest rate, as a percentage;

$n$  – number of compounding periods.

It also calls  $\text{FVIF}_{i,n}$

*Example:*  $\text{spfv}(2,10)=1.21899$

### Uniform Series Present Value.

**uspv**

Present value of an annuity of \$1 per period for  $n$  periods.

$$\text{uspv}(i\%, n) = \sum_{i=1}^n \frac{1}{\left(1 + \frac{i\%}{100}\right)^n} = \frac{1 - \left(1 + \frac{i\%}{100}\right)^{-n}}{\frac{i\%}{100}}$$

$i\%$  - periodic interest rate, as a percentage;

$n$  – number of compounding periods.

It also calls  $\text{PVIFA}_{i,n}$

*Example:*  $\text{uspv}(2,10)=8.98259$

**Uniform Series Future Value.****usfv**

Future value of an annuity of \$1 per period for  $n$  periods.

$$\text{usfv}(i\%, n) = \sum_{i=1}^n \left(1 + \frac{i\%}{100}\right)^{n-1} = \frac{\left(1 + \frac{i\%}{100}\right)^n - 1}{\frac{i\%}{100}}$$

$i\%$  - periodic interest rate, as a percentage;

$n$  – number of compounding periods.

It also calls  $\text{FVIFA}_{i,n}$

**Example:**  $\text{usfv}(2,10)=10.94972$

## Business calculations.

Choose 'Business' in category menu.

chg%o	chg%n	chg%p	
totl%pr	totl%p	totl%t	
mc%m	mc%p	mc%c	NEXT ▶
mp%m	mp%p	mp%c	PREV ◀

### chg%p, chg%p(old, new)

The difference between *old* and *new* expressed as a percentage of *old*.

$$\%chg = \frac{new - old}{old} \times 100$$

Example: chg%p(200,220)=10

### chg%o, chg%o(new, %chg)

Get initial value of the number (*old*), according to its changed value (*new*) and a percent of change of the initial value (*old*).

$$old = \frac{new}{100 + \%chg} \times 100$$

Example: chg%o(220,10)=200

### chg%n, chg%n(old, %chg)

Get value of the number (*new*), according to its initial value (*old*) and its percent of change.

$$new = \frac{(100 + \%chg) \times old}{100}$$

Example: chg%n(200,10)=220

### totl%pr, totl%pr(total, part)

The portion that one number *part* is of another *total*, expressed as a percentage.

$$\%total = \frac{part}{total} \times 100$$

Example: totl%pr(200,20)=10

**totl%p, totl%p(total, %total)**

Get a part of *total*, according to percent of the total (*%total*).

$$part = \frac{total \times \%total}{100}$$

*Example:* totl%p(200,20)=40

**totl%t, totl%t(part, %total)**

Get a *total* value according to its *part* and percent of this part relative to total (*%total*).

$$total = \frac{part}{\%total} \times 100$$

*Example:* totl%t(40,20)=200

**mc%m, mc%m(price, cost)**

The difference between *price* and *cost*, expressed as a percentage of cost.

$$markup = \frac{price - cost}{cost} \times 100$$

*Example:* mc%m(220,200)=10

**mc%p, mc%p(markup, cost)**

Get *price* value according to *cost* and *markup* as a percentage of cost

$$price = \frac{(100 + markup) \times cost}{100}$$

*Example:* mc%p(10,200)=220

**mc%c, mc%c(markup, price)**

Get a *cost* value according to *price* and *markup* as a percentage of cost.

$$cost = \frac{price}{100 + markup} \times 100$$

*Example:* mc%c(10,220)=200

**mp%m, mp%m(price, cost)**

The difference between *price* and *cost* expressed as a percentage of the price.

$$\text{markup} = \frac{\text{price} - \text{cost}}{\text{price}} \times 100$$

*Example:* mp%m(200,180)=10

### **mp%p**, mp%p(markup, cost)

Get *price* value according to *cost* and *markup* as a percentage of the price.

$$\text{price} = \frac{-\text{cost}}{\text{markup} - 100} \times 100$$

*Example:* mp%p(10,180)=200

### **mp%c**, mp%c(markup, price)

Get *cost* according to *price* and *markup* as a percentage of the price.

$$\text{cost} = \frac{(\text{markup} - 100) \times \text{price}}{-100}$$

*Example:* mp%c(10,200)=180

## Statistics calculations.

Choose 'Statistics' in category menu.

REGR	nrmpdf	tpdf	chi2pdf
invnrm	nrmcdf	tcdf	chi2cdf
			NEXT ▶

binpdf	poispdf		PREV ◀
bincdf	poiscdf		

### Statistics.

REGR

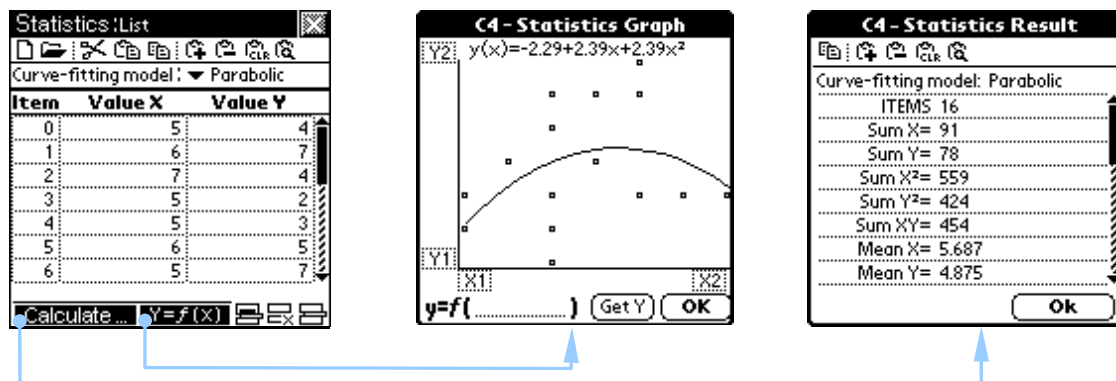
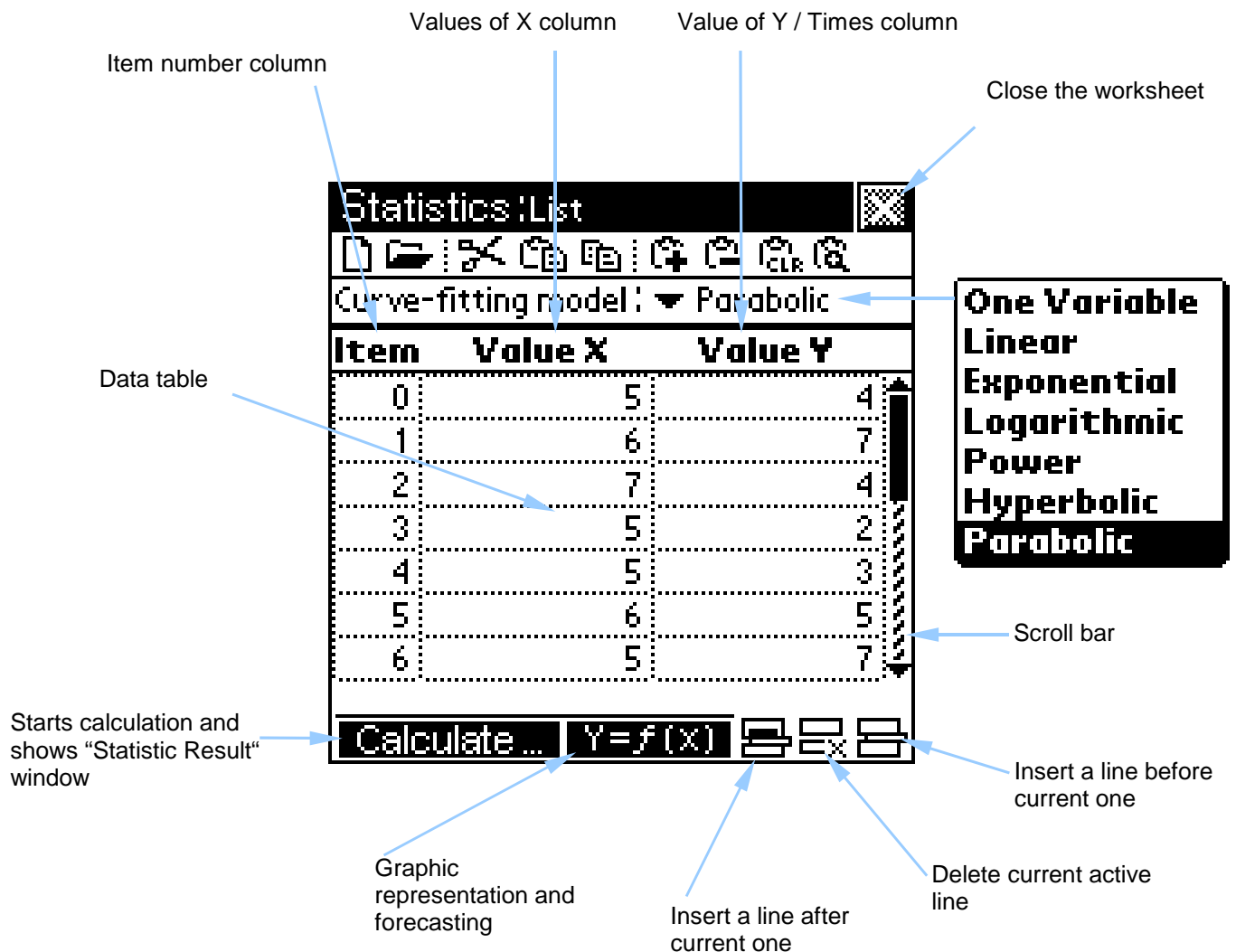
The "Statistics" worksheet is used to analyze sets of numbers. The following calculations and analyses are available.

#### For one variable statistical data row:

- total number of items
- a sum of squares
- mean
- maximum and minimum
- range
- standard deviation
- standard deviation of a discrete random variable
- median
- mode

#### For two variables (x, y) statistics data row:

- 6 multiple regression models (linear, exponential, logarithmic, power, hyperbolic, parabolic) and analysis for the purpose of prediction
- graphic representation of each of the models
- $\sum x$ ,  $\sum y$ ,  $\sum x^2$ ,  $\sum y^2$ ,  $\sum xy$
- mean  $x$  and  $y$
- maximum  $x$  and  $y$ , minimum  $x$  and  $y$
- range  $x$  and  $y$
- standard deviation  $x$  and  $y$
- weighted mean

**Statistics worksheet.****Create new Statistics list.**

In order to create a new list of data for this worksheet you have to tap "new list" button. (□).



You will be asked for a name for the new list.




Enter a name, up to 11 symbols.

Your current data list will be saved automatically. If you do not need it, go to “User Data Manager” and delete it.

When you start the Statistics worksheet for the first time (after installation), you should define a name of the first data list before it starts.

### ***Load existing worksheet.***

In order to load an existing worksheet tap the “User Data Manager” button (‘’). Choose the name you need and tap “Open” button. The list will be loaded.

### ***Calculations.***

1. Prior to any calculation define the curve-fitting model. When you are switching from “One Variable” or to “One Variable” you will be asked a confirmation to convert cells’ type. It is necessary because numbers in the “Times” column are integer, but numbers in “Value Y” column (that appears when you when you are switching from “One Variable”) are real and can have a fractional part.
2. Fill out cells in the input data table.
3. Tap button ‘**Calculate...**’ and the result will appear in C4-Statistics Result window. Tap ‘ **$Y=f(X)$** ’ to see a graphic representation of the set of data you’ve entered and play with the computed model (forecasting).

### ***Regression models and analysis.***

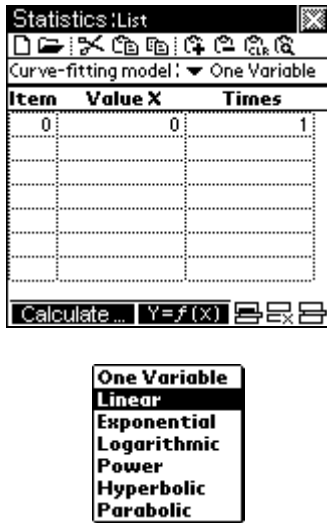
Regression analysis is used primarily for the purpose of prediction. Correlation analysis, in contrast to regression, is used to measure the strength of the association between numerical variables. The nature of the relationship can take many forms, ranging from simple ones to extremely complicated mathematical functions. Currently C4Finance maintains 6 multiple regression (or curve-fitting) models.

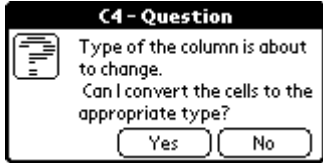
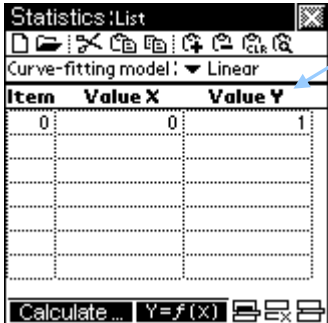
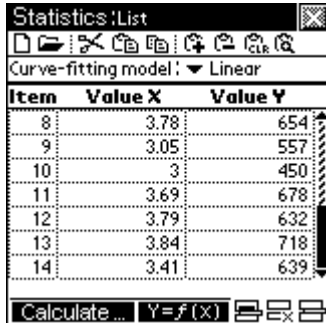
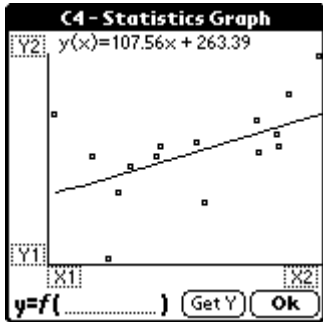
<b>Linear</b>	$y = B0 + B1x$
<b>Exponential</b>	$y = B0 e^{B1x}$
<b>Logarithmic</b>	$y = B0 + B1 \ln(x)$
<b>Power</b>	$y = B0 x^{B1}$
<b>Hyperbolic</b>	$y = B0 + \frac{B1}{x}$
<b>Parabolic</b>	$y = B0 + B1x + B2 x^2$

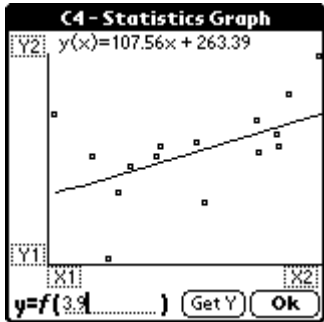
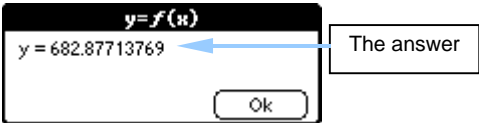
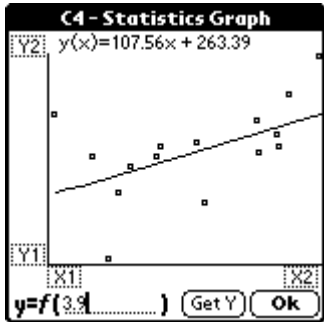
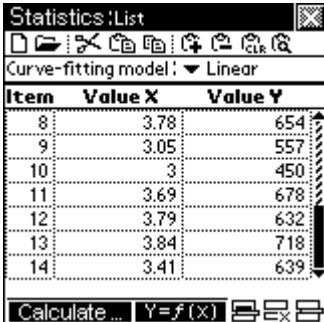
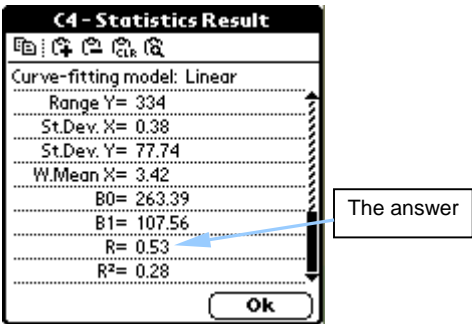
**Examples.**

Based on statistical data of undergraduate GPA, try to predict the future GMAT score for a GPA 3.9. Use the linear curve-fitting model. How strong is the relationship between GPA and GMAT score?

##	Undergraduate GPA	GMAT Score
1	2.93	617
2	2.75	688
3	3.24	632
4	3.23	616
5	3.11	599
6	3.45	542
7	3.70	624
8	3.97	784
9	3.78	654
10	3.05	557
11	3.00	450
12	3.69	678
13	3.79	632
14	3.84	718
15	3.41	639

Keys/Actions:	Display:	Description:
<p>Tap '□' if you need to create new empty list. You can clear current list by tapping '☒' key 2 times when the table does not have cursor in any cells.</p> <p>Choose linear curve-fitting model</p>		<p>Let's start with a clear list</p>

Keys/Actions:	Display:	Description:																								
Confirm data conversion, tap "Yes".	 <p>C4 - Question</p> <p>Type of the column is about to change. Can I convert the cells to the appropriate type?</p> <p>Yes No</p>	Current "Times" column can keep integer numbers only. When you choose any of the curve-fitting models ("One Variable" is not a curve fitting model actually) "Times" column becomes a "Variable Y" column, which can hold numbers other than integers.																								
Fill out the table according to the problem.	 <p>Statistics:List</p> <p>Curve-fitting model: Linear</p> <table border="1"> <thead> <tr> <th>Item</th><th>Value X</th><th>Value Y</th></tr> </thead> <tbody> <tr><td>0</td><td>0</td><td>1</td></tr> <tr><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td></tr> </tbody> </table> <p>Calculate ... <math>Y=f(X)</math></p> <p>Changed from "Time" to "Value Y"</p>	Item	Value X	Value Y	0	0	1																			Now you are ready to start entering data.
Item	Value X	Value Y																								
0	0	1																								
Tap ' $Y=f(X)$ '	 <p>Statistics:List</p> <p>Curve-fitting model: Linear</p> <table border="1"> <thead> <tr> <th>Item</th><th>Value X</th><th>Value Y</th></tr> </thead> <tbody> <tr><td>8</td><td>3.78</td><td>654</td></tr> <tr><td>9</td><td>3.05</td><td>557</td></tr> <tr><td>10</td><td>3</td><td>450</td></tr> <tr><td>11</td><td>3.69</td><td>678</td></tr> <tr><td>12</td><td>3.79</td><td>632</td></tr> <tr><td>13</td><td>3.84</td><td>718</td></tr> <tr><td>14</td><td>3.41</td><td>639</td></tr> </tbody> </table> <p>Calculate ... <math>Y=f(X)</math></p>	Item	Value X	Value Y	8	3.78	654	9	3.05	557	10	3	450	11	3.69	678	12	3.79	632	13	3.84	718	14	3.41	639	
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13	3.84	718																								
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	 <p>C4 - Statistics Graph</p> <p><math>y(x)=107.56x + 263.39</math></p> <p>Y2</p> <p>Y1</p> <p>X1</p> <p>X2</p> <p><math>y=f( \dots )</math> Get Y Ok</p>	Look at the graphical data set representation and function of the linear model.																								

Keys/Actions:	Display:	Description:
Enter 3.9 in 'y=f(_____)' field		Enter required GPA.
Tap 'Get Y' button.		Get a prediction of GMAT score for GPA 3.9
Tap 'Ok'		Close "y=f(x)" window
Tap 'Ok'		Close "C4-Statistics Graph" window
Tap 'Calculate...' and scroll table down.		Gets correlation coefficient that shows how strong is relationship between GPA and GMAT score. R=0.53

## Distribution functions.


Note. Decimal place value is 4 for all of the examples for this section.

(Tap the application menu, Option → Preferences... **Decimal Place:**

0	1	2	3	4	5	6	7	8	9	All
---	---	---	---	---	---	---	---	---	---	-----

)

In order to see a graph in the Graphics Explorer, for example  $y(x)=\text{normpdf}(x, 0, 1)$ , you should do the following steps:

1. From Main Screen go to the Equation Solver (MENU->Equation Solver).
2. Open the Equation Editor window (tap 'Edit' button).
3. Enter into "Current Equation" field an equation you want in "Equal to Zero" format, for example: " $\text{normpdf}(x, 0, 1)=0$ ".
4. Tap 'Save' button.
5. Check that 'x' variable in the "Variables of the equation" list is empty (doesn't have any value).
6. Tap "Graphics Explorer" button (  ).
7. Now you should set zoom to see the graph.

For example

$$X1 = -3.125$$

$$X2 = 3.125$$

$$Y1 = -0.15625$$

$$Y2 = 0.625$$

Tap the corresponding triggers to set the values.

8. Now, you should see the graph.

**normpdf**,  $\text{normpdf}(x, \mu, \sigma)$  ;  $\sigma > 0$

**X** – specified value, real number.

**$\mu$**  - mean.

**$\sigma$**  - standard deviation.

Returns the probability density for the normal distribution for 'x' value.

Example:  $\text{normpdf}(3, 4, 2) = 0.176$

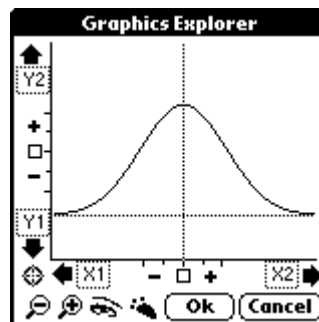
$$y(x)=\text{normpdf}(x, 0, 1);$$

$$X1 = -3.125$$

$$X2 = 3.125$$

$$Y1 = -0.15625$$

$$Y2 = 0.625$$



**normcdf**, normcdf( $x, \mu, \sigma$ ) ;  $\sigma > 0$

$X$  – specified value, real number.

$\mu$  - mean.

$\sigma$  - standard deviation.

Returns the cumulative probability density for the normal distribution, from ‘-infinity’ to ‘x’ value.

Example: normcdf(3, 4, 2) = 0.3085

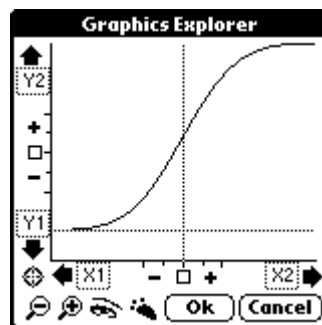
y(x)=normcdf(x, 0, 1);

X1= -3.125

X2=3.125

Y1= -0.15625

Y2=1



**invnorm**, invnormcdf( $p, \mu, \sigma$ ) ;  $0 < p < 1, \sigma > 0$

$p$  – probability.

$\mu$  - mean.

$\sigma$  - standard deviation.

Returns the inverse cumulative probability distribution.

Example: invnormcdf(0.5, 3, 2) = 3

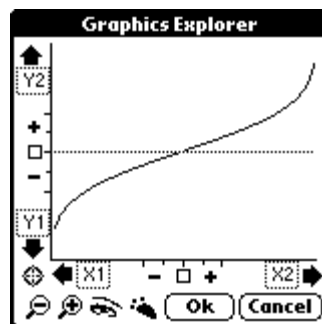
y(x)=invnormcdf(x, 0, 1);

X1= 0

X2=1

Y1= -3

Y2=3



**tpdf**, tpdf( $x, d$ ) ;  $d > 0$

$X$  – specified value, real number.

$d$  – degrees of freedom.

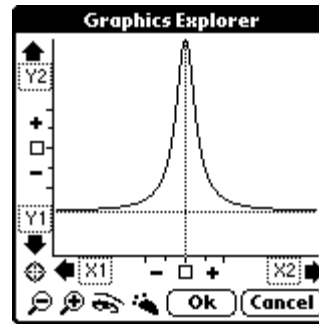
Returns the probability density for the Student's  $t$  distribution, for ‘x’ value.

Example: tpdf(4, 2) = 0.0131

```

y(x)=tpdf(x, 1);
X1= -12
X2=12
Y1= -0.05
Y2=0.3125

```



**tcdf**,  $\text{tcdf}(x, d) ; d > 0$

**X** – specified value, real number.

**d** – degrees of freedom.

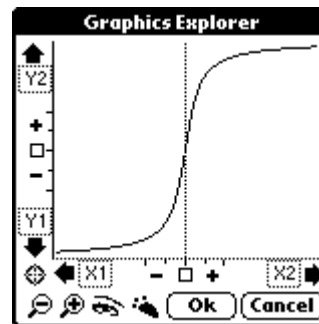
Returns the cumulative probability density for the Student's  $t$  distribution, from ‘–infinity’ to ‘x’ value.

Example:  $\text{tcdf}(4, 2) = 0.9714$

```

y(x)=tpdf(x, 1);
X1= -12
X2=12
Y1= 0
Y2=1

```



**chi2pdf**,  $\text{chi2pdf}(x, d) ; x > 0, d > 0$

**X** – specified value.

**d** – degrees of freedom.

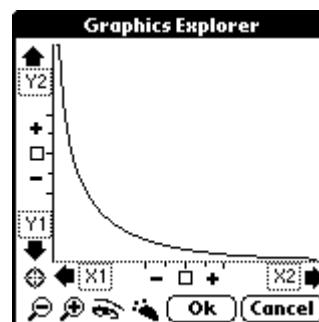
Returns the chi-squared distribution for ‘x’ value.

Example:  $\text{chi2pdf}(2, 5) = 0.1384$

```

y(x)=chi2pdf(x, 1);
X1= 0
X2=6
Y1= 0
Y2=1

```



**chi2cdf**,  $\text{chi2cdf}(x, d)$  ;  $x > 0, d > 0$

**X** – specified value.

**d** – degrees of freedom.

Returns the cumulative probability density for the chi-squared distribution, from ‘-infinity’ to ‘x’ value.

Example:  $\text{chi2cdf}(2, 5) = 0.1509$

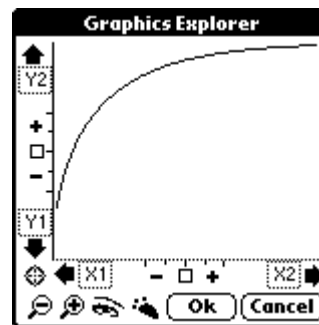
$y(x) = \text{chi2cdf}(x, 1);$

X1= 0

X2=6

Y1= 0

Y2=1



**binpdf**,  $\text{binompdf}(p, k, n)$  ;  $0 \leq p \leq 1, 0 \leq k \leq n$  .

**p** – probability of success.

**k** – number of successes in the sample.

**n** – sample size.

Returns the probability density for the binomial distribution.

Example:  $\text{binompdf}(0.5, 40, 100) = 0.0108$

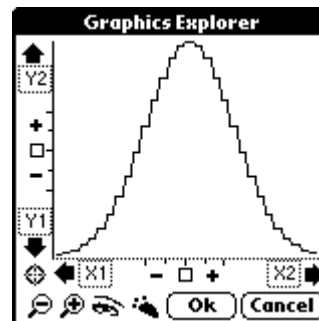
$y(x) = \text{binompdf}(0.5, k, 100);$

X1= 35

X2=65

Y1= 0

Y2=0.08





**binomcdf**, binomcdf( $p$ ,  $k$ ,  $n$ ) ;  $0 \leq p \leq 1$ ,  $0 \leq k \leq n$  .

$p$  – probability of success.

$k$  – number of successes in the sample.

$n$  – sample size.

Returns the cumulative probability density for the binomial distribution.

Example: binomcdf(0.5, 40, 100) = 0.0284

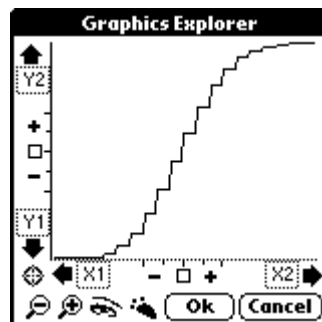
$y(x) = \text{binomcdf}(0.1, k, 100);$

$X1 = 0$

$X2 = 20$

$Y1 = 0$

$Y2 = 1$



**poispdf**, poissonpdf( $x$ ,  $\lambda$ ) ;  $x > 0$ ,  $\lambda > 0$ .

$X$  – number of successes per unit (non-negative integer).

$\lambda$  – expected number of successes.

Returns the probability density for the Poisson distribution.

Example: poissonpdf(2, 4) = 0.1465

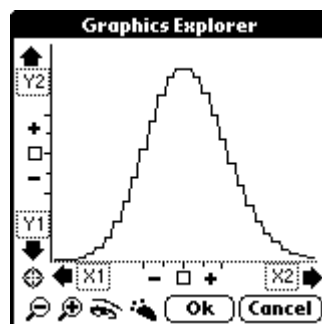
$y(x) = \text{poissonpdf}(x, 20);$

$X1 = 5$

$X2 = 35$

$Y1 = 0$

$Y2 = 0.1$



**poiscdf**,  $\text{poissoncdf}(x, \lambda)$  ;  $x > 0, \lambda > 0$ .

$X$  – number of successes per unit (non-negative integer).

$\lambda$  – expected number of successes.

Returns the cumulative probability density for the Poisson distribution.

Example:  $\text{poissonpdf}(2, 4) = 0.2381$

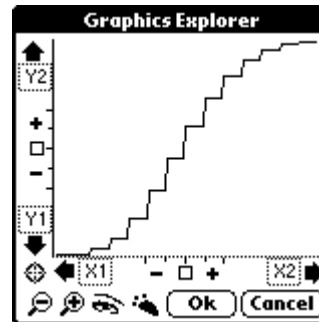
$y(x) = \text{poissoncdf}(x, 7)$ ;

$X1 = 0$

$X2 = 14$

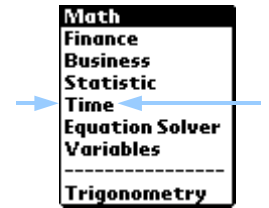
$Y1 = 0$

$Y2 = 1$



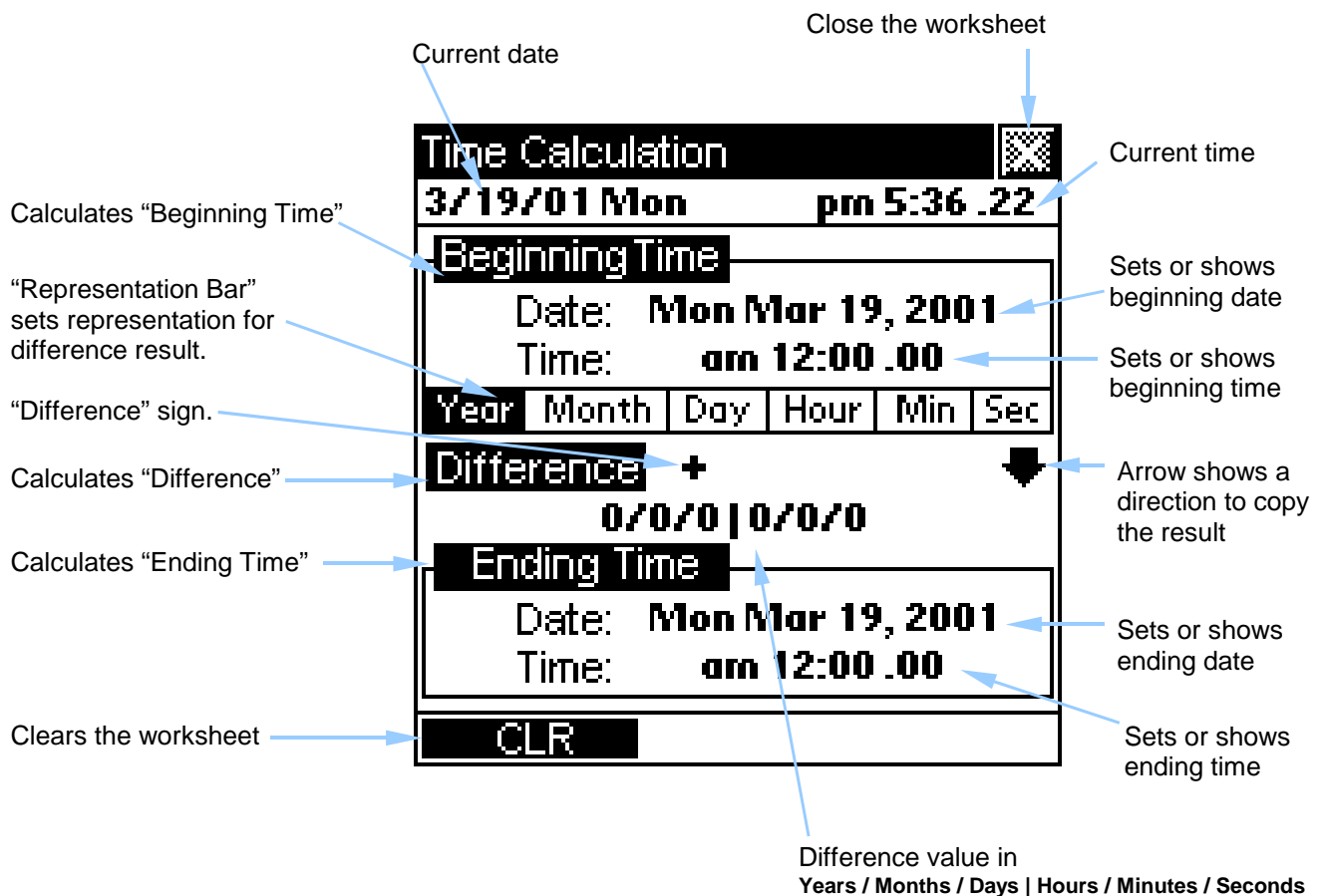
## Time calculations.

Choose 'Time' in category menu.



The Time worksheet performs calculations based on the real calendar. Time in this worksheet is inseparably linked from seconds to years. For example, if you calculated how many years are left to your retirement from today, you can easily get how many seconds it is.

### *Time worksheet.*



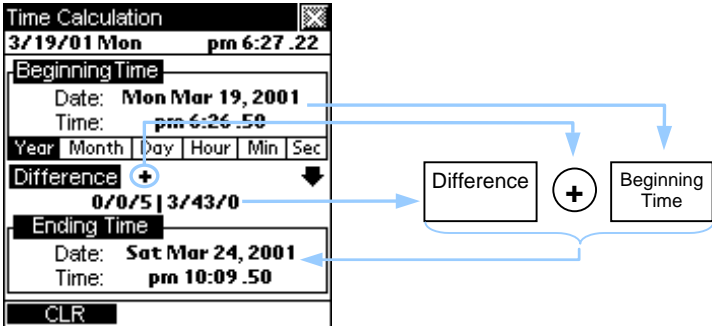
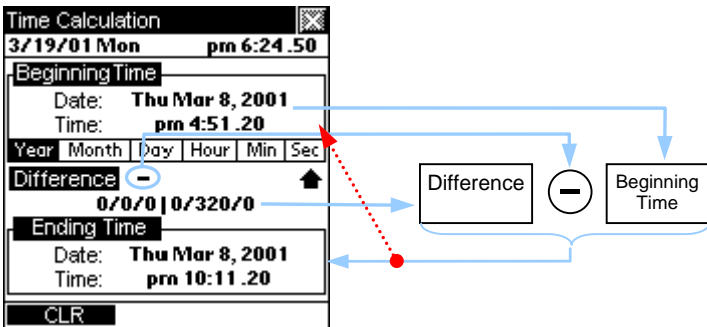
### Calculations.

1. Set two of three parameters. (Beginning Date, Ending Date, Difference)
2. Set “Difference” sign if you calculate Beginning or Ending Date (i.e. use “Difference” in calculations)
3. Set direction to put result if you calculate Beginning or Ending Date.
4. Set representation look if you calculate difference.
5. To get result tap the corresponding button (one of the following: ‘BeginningTime’, ‘Difference’, ‘Ending Time’)

### Order of calculations.

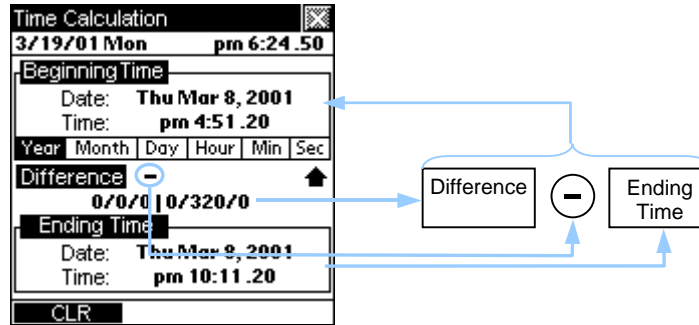
By using the arrow (‘↓’ or ‘↑’) and ‘BeginningTime’, ‘Difference’, ‘Ending Time’ buttons you can set the order of calculations and where to copy the result. The arrow gives you additional flexibility in placing the result after a calculation. Look at the schemes below to understand how to use the arrow buttons.

This button will be useful if you do a chain of calculations, where each result depends on previous calculations.

Arrow's Direction	Pressed Button	Calculation Scheme	Description
↓	Ending Time		This is a standard scheme. Adds difference to Beginning Time (date and time) and puts the result in Ending Time register.
↑	Ending Time		This is an extended scheme. Everything is similar to the previous standard scheme, however now it copies Ending Time (date and time) to Beginning Time.



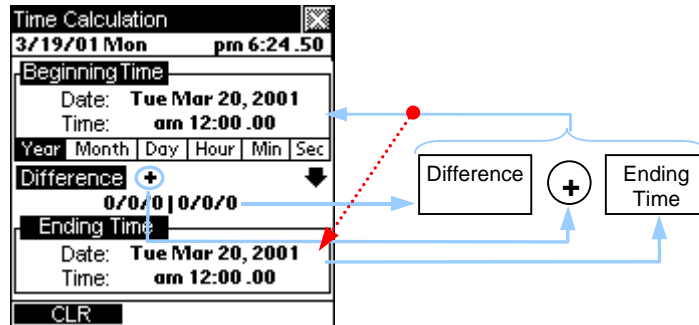
Beginning Time



This is a standard scheme. Subtracts difference from Ending Time (date and time) and puts the result in Beginning Time register.



Beginning Time



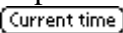

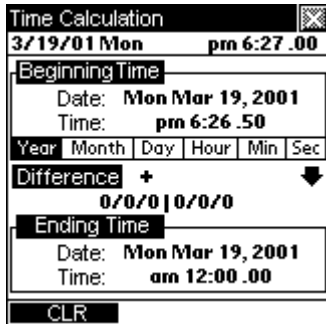



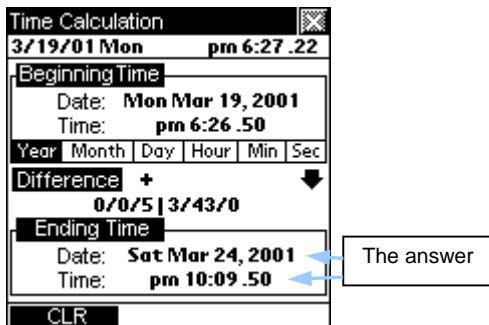
This is an extended scheme. Everything is similar to the previous standard scheme, however now it copies Beginning Time (date and time) to Ending Time.

### Examples.

#### Calculating “Ending Time”.

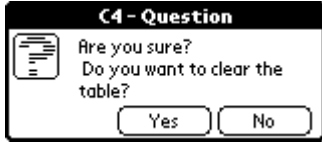



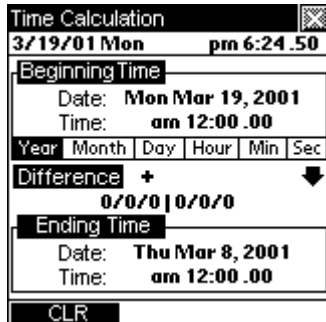

What date and time will be after 5 days 3 hours and 43 minutes from now? Suppose now is March 19, 2001, and you start calculation at pm 6:24.50 .

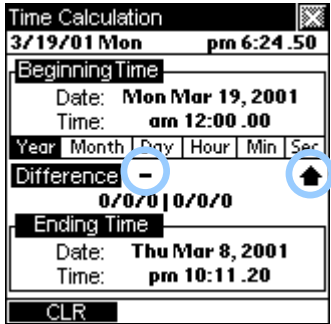

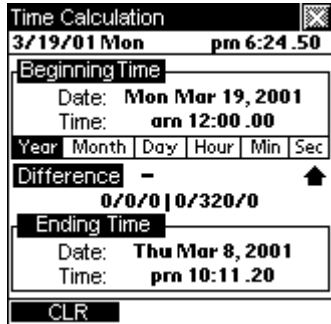
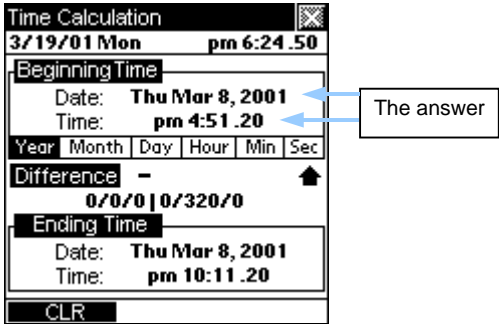
Keys/Actions:	Display:	Description:
Tap ‘CLR’ then confirm ‘Yes’.	 	<p>The look depends on what date today is. Suppose now is March 19, 2001, pm 6:24 .50</p>

Keys/Actions:	Display:	Description:
Tap 'am 12:00.00' then  button.		Put current time. Suppose at the moment you tap 'Current Time' button it is pm 6.26. 50
Tap 'Ok'		Go back to the "Time Calculation" worksheet.
Tap '0/0/0   0/0/0' then enter 5 days, 3 hours and 43 minutes.		Enter a difference from the current date.
Tap 'Ok'		Go back to the "Time Calculation" worksheet.
Tap '  '		Get the answer. If currently it is March 19, 2001, pm 6:24 .50 then after 5 days 3 hours and 43 seconds the date and time will be March 24, 2001 pm 10:09 .50

### Calculating “Beginning Time”.

Calculate date and time 320 minutes before March 8, 2001 pm 10:11 .20.

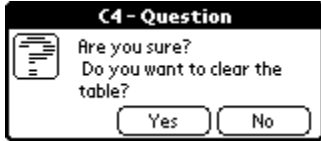




Keys/Actions:	Display:	Description:
<p>Tap ‘CLR’ then confirm ‘Yes’.</p>		
<p>Tap ‘Mon Mar 19, 2001’ of <u>Ending Time</u> then choose March 8, 2001.</p>		<p>The look depends on what date today is. Suppose right now it is March 19, 2001, pm 6:24 .50</p>
<p>Tap ‘am 12:00 .00’.</p>		<p>Choose a date.</p>
<p>Set “pm 10:11 .20” by using  and choosing corresponding number. Tap ‘Ok’ to store chosen time.</p>	 	

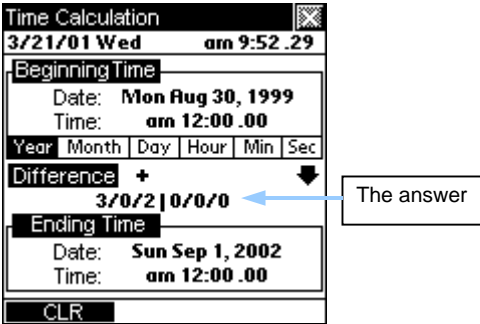

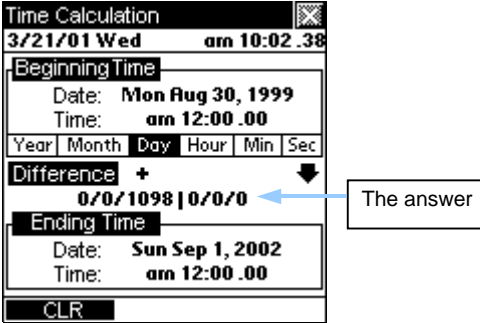

Keys/Actions:	Display:	Description:
<p>Tap '↓' to change the arrow's direction. Also, tap '+' to change the sign.</p> <p>Tap '0/0/0 0/0/0' then set difference. Tap 'Ok' to store the value.</p>	  	<p>'-' needs to perform subtraction from chosen time. '↑' shows where to copy the result. Actually you do it to avoid copying Beginning Time to Ending time (in case of '↓').</p> <p>Sets the difference according to the problem</p> <p>Ready to start calculation.</p>
<p>Tap 'Beginning Time'</p>		<p>The answer is March 8, 2001; pm 4:51 .20</p>

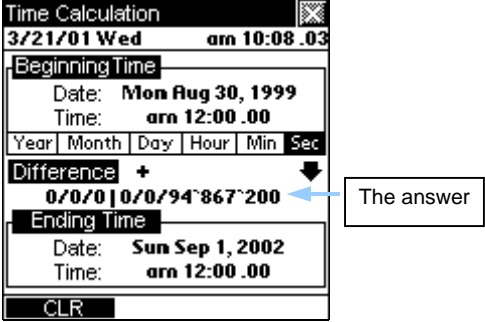


## Calculating "Difference".

What is the difference between August 30, 1999 and September 1, 2002? Also get it in days and seconds.

Keys/Actions:	Display:	Description:
Tap 'CLR' then confirm 'Yes'.		
Tap 'Wed Mar 21, 2001' of Beginning Date and set August 30, 1999		The look depends on what date today is. Suppose now it is March 21, 2001, am 9:24 .20
Tap 'Wed Mar 21, 2001' of Ending Date and set September 1, 2002	 	Sets the first date.
		Sets the second date.

Keys/Actions:	Display:	Description:
Tap 'Difference'		The difference between August 30, 1999 and September 1, 2002 is 3 years 2 days.
Tap 'Day' in the Representation Bar.		Now the difference will be presented in <b>Days   Hours / Minutes / Seconds</b> format.
Tap 'Difference'		The difference between August 30, 1999 and September 1, 2002 is 1,098 days.
Tap 'Sec' in the Representation Bar		Now the difference will be presented in Seconds format.

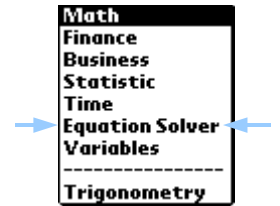
Keys/Actions:	Display:	Description:
Tap 'Difference'		The difference between August 30, 1999 and September 1, 2002 is 94,867,200 seconds.

In the example above, the arrow's direction ('⬇' or '⬆') does not matter. The '+' sign shows that the difference between the Ending Date and the Beginning Date is positive.

## Equation Solver.

Unavailable for C4Finance Standard users

Choose 'Equation Solver' in category menu.

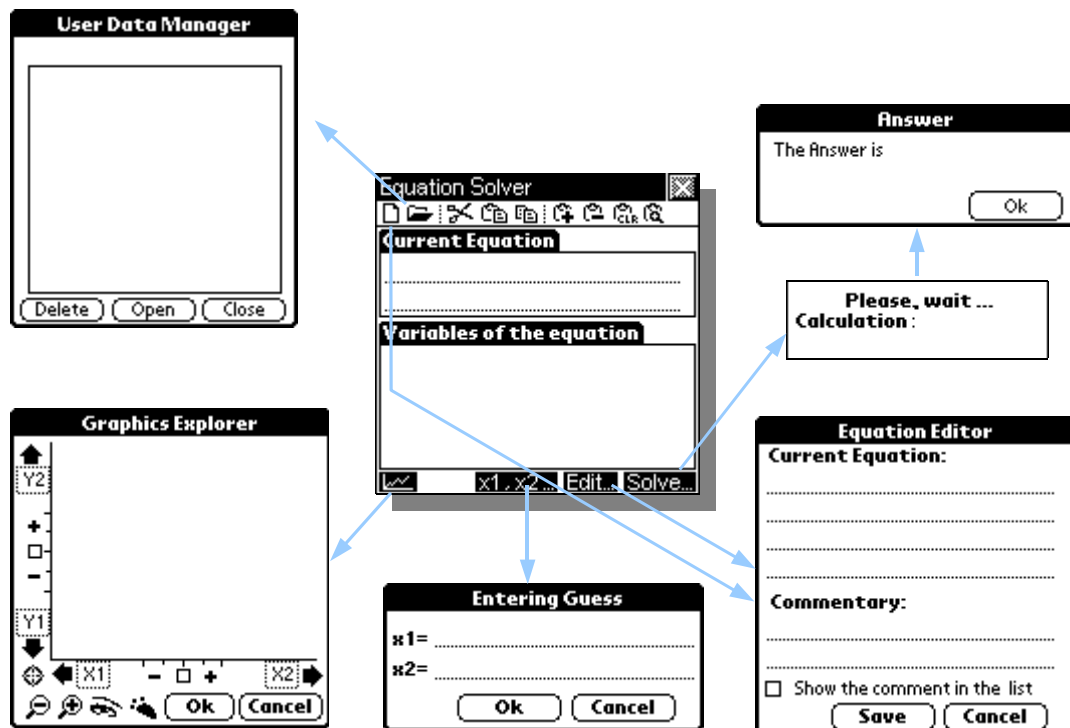


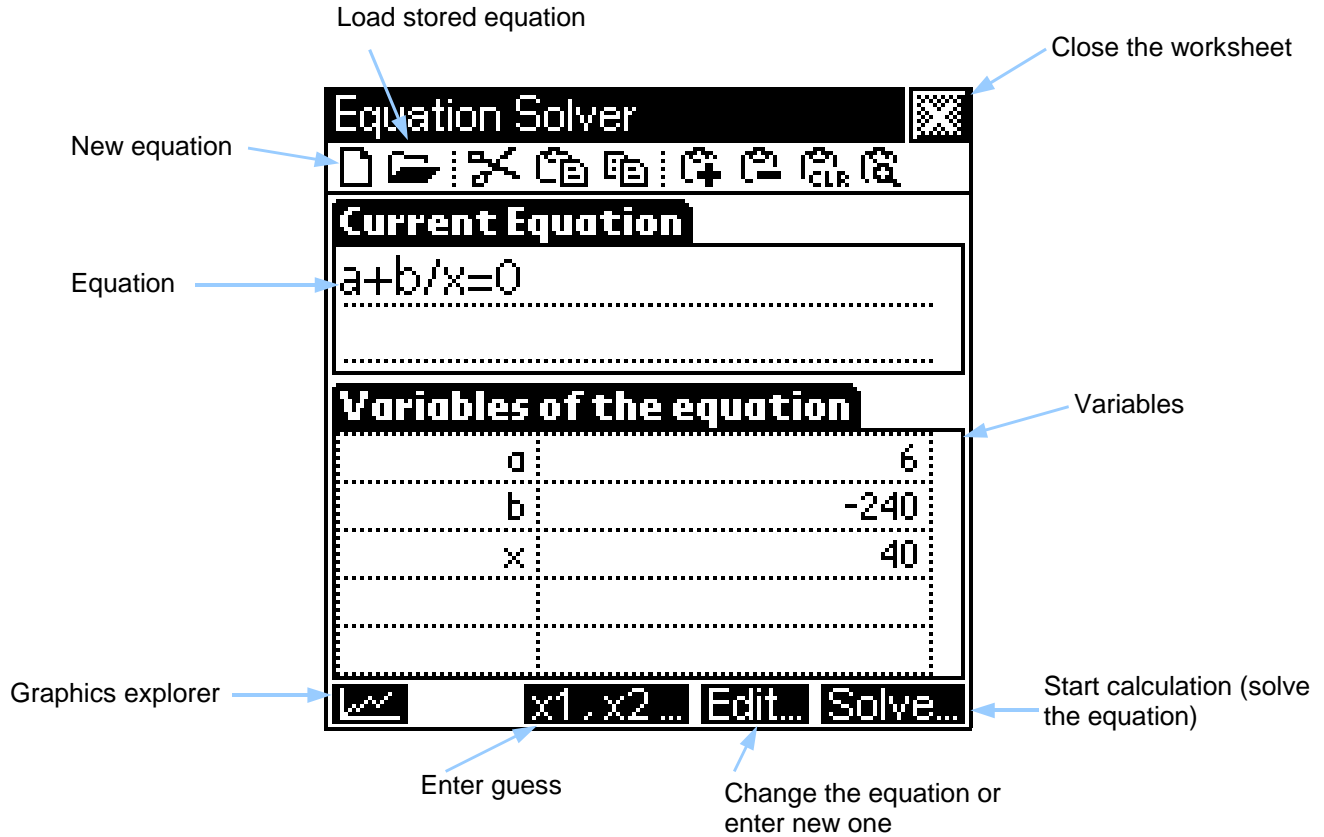
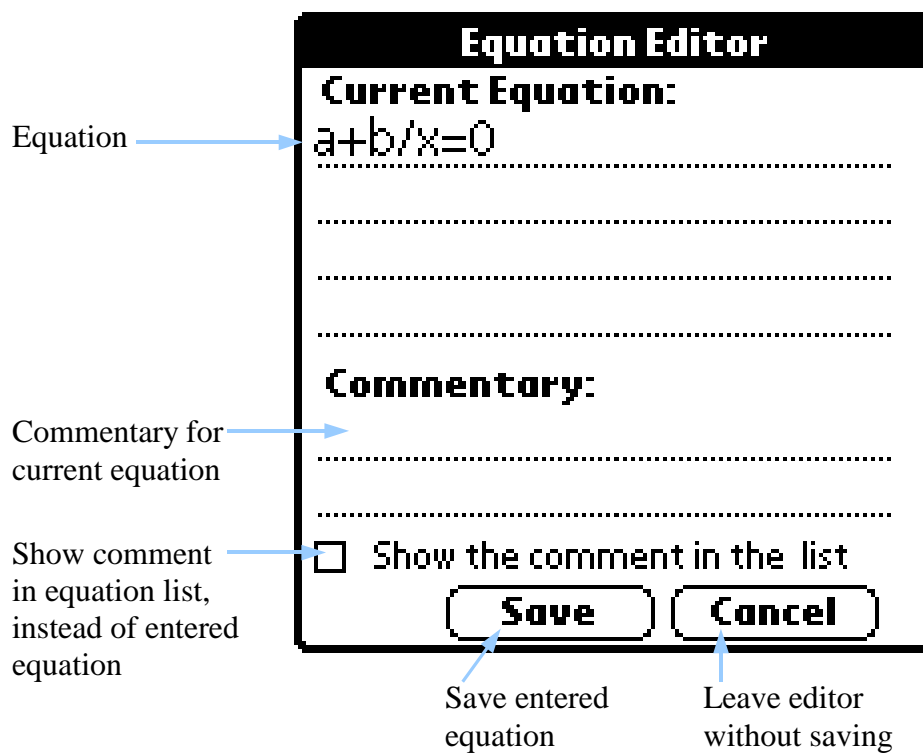
The Equation Solver worksheet performs calculations with custom equations and formulas in algebraic form. It lets you find the answer for any unknown variable of the equation you have entered. The solver lets you store your equations (up to 40).

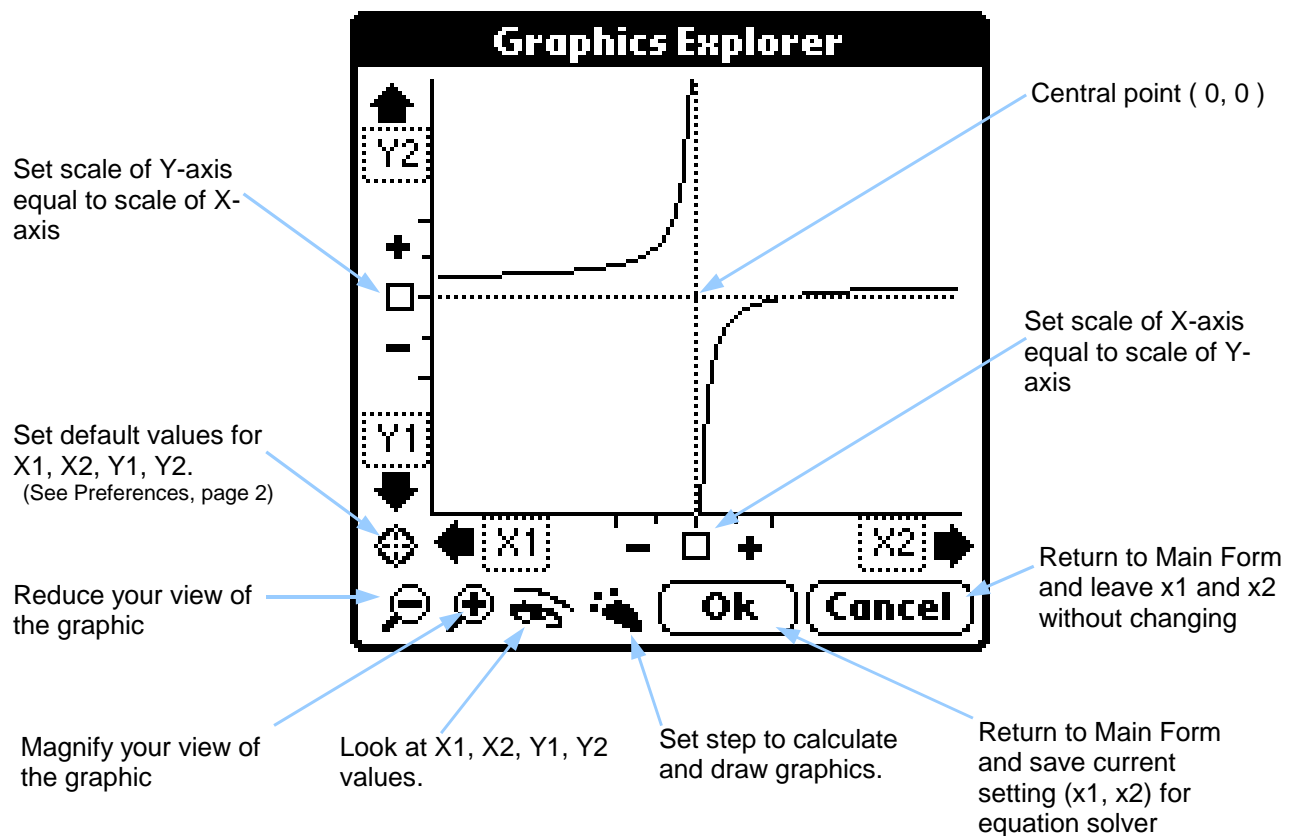
### *Equation Solver worksheet.*

The equation solver consists of three components

- **Main Form** is the central part. It lets you store and load equations, enter variables, set parameters and go to other components.
- **Equation Editor** is the part to enter equations.
- **Graphics Explorer** is the part that allows you to set calculation parameters for the Equation Solver; also it lets you explore the graph of the equation.



**Main Form****Equation Editor**

**Graphics Explorer**

	Move graphic left		Move graphic up
	Move graphic right		Move graphic down
	Set or view X1 value		Set or view Y1 value
	Set or view X2 value		Set or view Y2 value
	Increase scale of axis or stretch graphic in one of the dimensions		Decrease scale of axis or squeeze graphic in one of the dimensions

**Calculations.**

1. Enter an equation or formula. Tap 'Edit' to go to Equation Editor.
2. To save an equation and go to the Main Form tap 'Save' button in Equation Editor.
3. Enter or edit value of each known variable. All variables except the unknown one must contain a value.
4. Enter an initial guess for the variable for which you are solving ('x1, x2...'). It is optional, but would be very helpful to find a solution more quickly. Also, the guess is necessary if the equation has more than one root and you want to find only one certain root. Use Graphics Explorer to define a range for the guess ('x1, x2...').
5. Tap 'Solve' button to start calculation and find an answer.
6. Tap screen to stop calculation.

**How Equation Solver works. Limitations.**

Equation Solver uses two methods to find solutions. Choosing a method depends on the complexity of the equation. Initially the solver tries to find a *direct* solution (or symbolic solution) if the attempt is not successful the solver tries to find *iterative* solution.

The direct method tries to calculate the unknown variable by rearranging the equation. The unknown variable is moved to one side of the equation, known variables to the other side. For example, you've entered the equation:

$$A + B = C.$$

If 'B' is a variable you are solving for, Equation Solver rearranges internally the equation to

$$B = C - A.$$

Answers calculated this way are called *direct* solution. This method is absolutely exact and usually does not take a lot of time. However, a direct solution cannot always be found. For example:

$$E = \left(1 + \frac{A}{X}\right)^X ; \text{there is no symbolic solution for } X$$

Also, the solver cannot find a direct solution in case of more than one identical variable in the equation you have entered. For example:  $2x + x = 6$ .

If a direct solution was not found, the solver searches iteratively for it.

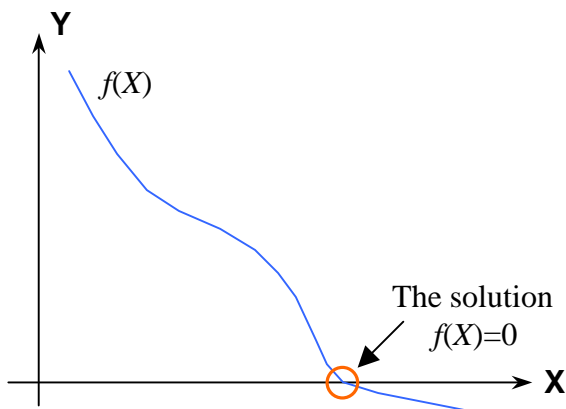
Initially the solver rearranges equation in "equal to zero" format. For example:

$$E = \left(1 + \frac{A}{X}\right)^X \Rightarrow \left(1 + \frac{A}{X}\right)^X - E = 0.$$

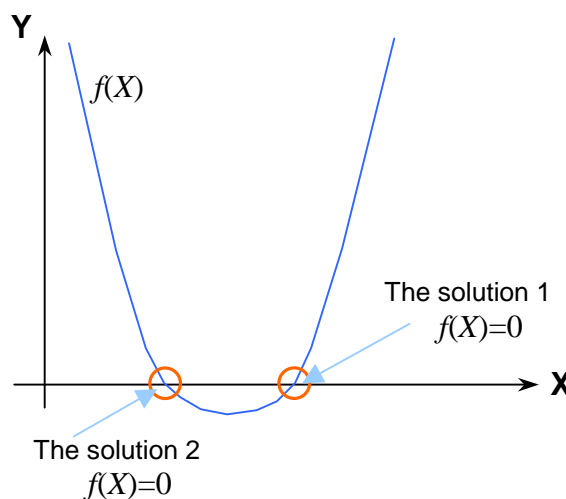
After that the solver transforms the equation to a function

$$f(X) = \left(1 + \frac{A}{X}\right)^X - E$$

and tries to find  $X$  where  $f(X)=0$ . The  $A$  and  $E$  variables you should define before the computation. Graphically a solution looks like the intersection of  $f(X)$  and the  $X$ -axis.



Keep in mind, there might be more than one solution to an equation.

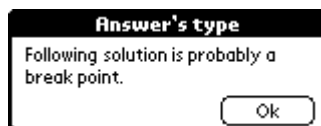


In the case of more than one solution to the equation, the solver stops when it finds any one of them. By defining new guesses and by using Graphics Explorer you can find the other solutions.

**Notice.** Graphics Explorer is a tool that you can use to define guesses. When you work with Graphics Explorer you should localize the area with one and only one intersection of  $f(x)$  and the X-axis. When you tap the 'Ok' button in Graphics Explorer the X1 and X2 values of the explorer copy to variables that Equation Solver uses as your guesses. To see these variables tap ' $x1, x2, \dots$ ' in the Equation Solver worksheet. However, if you've entered guesses (' $x1, x2, \dots$ ') and then go to Graphics Explorer, you will see that x1, x2 (guesses) were not copied to X1, X2 (explorer's X-range); the explorer uses its old values (or default).

The process of finding a solution iteratively is very complex and there is not a 100% guarantee that you will find an answer. There can be three possible outcomes.

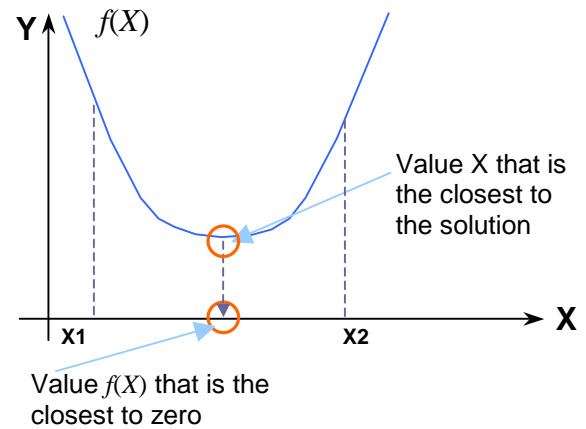
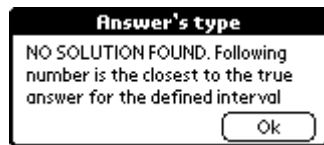
1. Equation Solver gives you a result and most probably the answer is a solution.
2. Equation Solver gives you a result and most probably the answer is a break point. The solver warns you in this case.



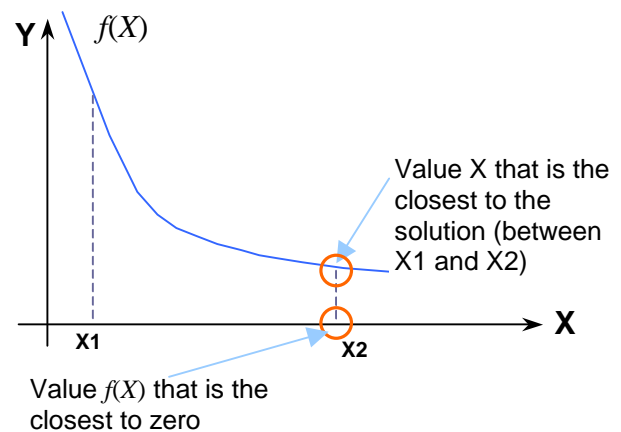


3. No solution was found; in this case the solver gives you a value, where  $f(X) \neq 0$ , but the closest to zero. The solver warns you in this case.

Example.



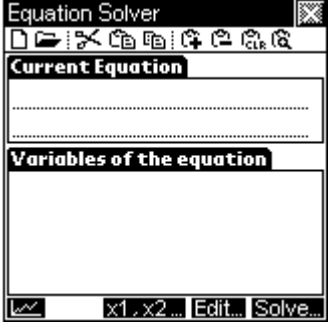
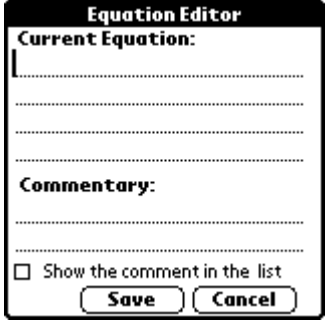
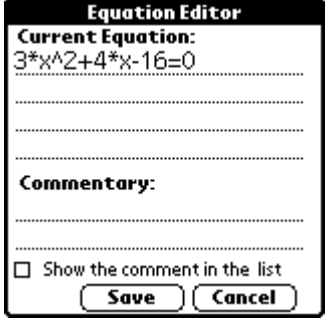
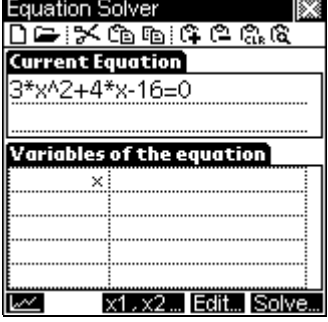
Example.


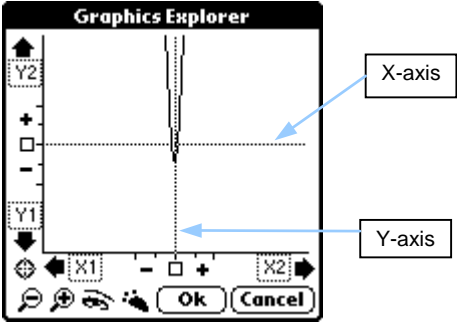

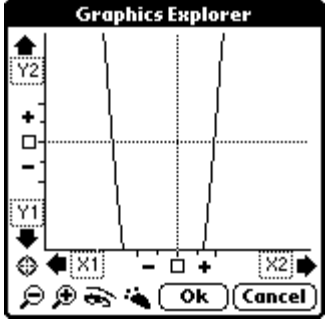

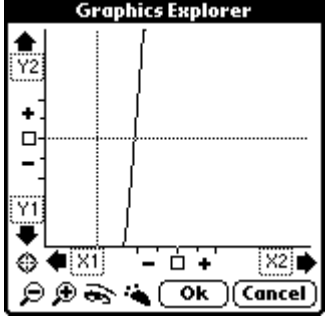
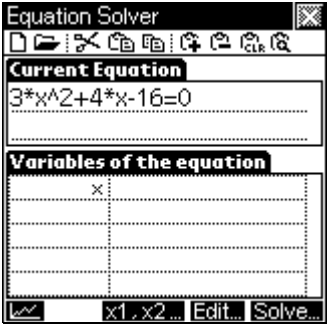



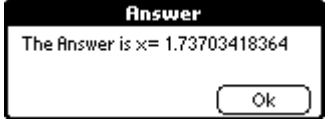


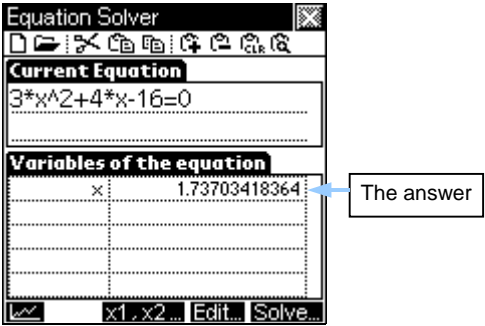
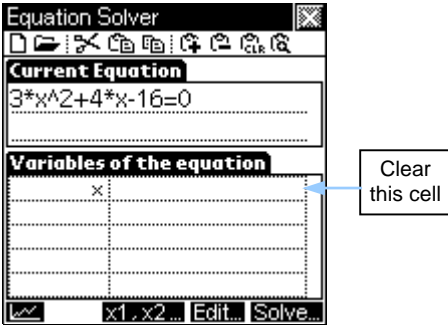

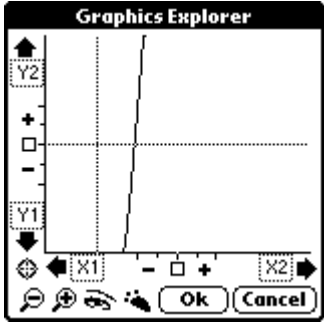

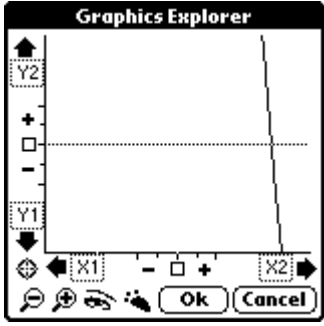
$f(X)$  Precision of the equation solver is a constant value and for this version is  $1E-11$ . If Equation Solver got function's value  $-1E-11 < f(X) < 1E-11$ , it considers the value as zero, stops calculation and gives you an answer  $X$ . Note,  $f(X)$  precision does not mean precision of the answer  $X$ . The  $1E-11$  value was intentionally set not too small in order to find the answer as soon as possible.

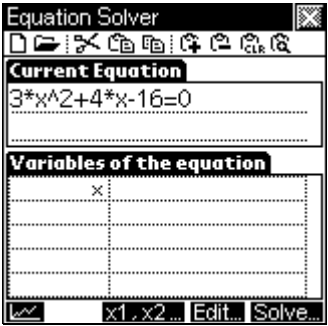

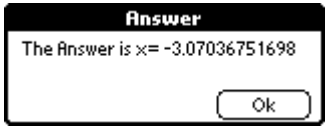
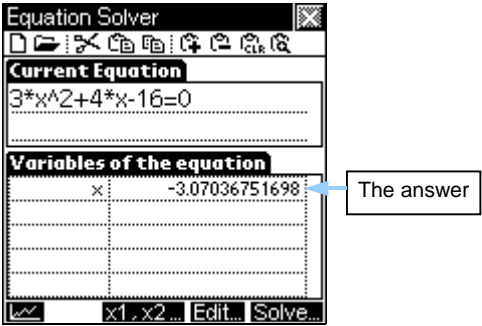
**Examples.**

**Equation.** Find both roots of the equation.  $3x^2 + 4x - 16 = 0$

Keys/Actions:	Display:	Description:
		Let start with new clear list.
Tap 'Edit' to get the equation editor or '□' to create new one.		Go to Equation Editor, to enter new equation.
$3*x^2+4*x-16=0$		Enter equation $3x^2 + 4x - 16 = 0$
Tap 'Save'		Enter the equation and get the list of variables.

Keys/Actions:	Display:	Description:
Tap 		Go to Graphics Explorer. Here is a graph of the function $f(x) = 3x^2 + 4x - 16$ . Intersections of $f(x)$ and the X-axis are solutions.
Tap  4 times		Get close look of the graphic.
Tap 		Get area that has <b>only one</b> intersection of $f(X)$ and the X-axis.
Tap 'Ok' to save X1 and X2 values for the solver and return to Main Form.		Now you are ready to start calculation for the first answer. Actually you just saved the guesses to find the first answer. To look at them, tap  .
Tap 	 	<p>Performing calculation</p> <p>Get the first answer.</p>

Keys/Actions:	Display:	Description:
Tap 'Ok' to return to Main Form	<div></div>	
Select the answer in variable list and clear the cell.	<div></div>	
Tap 	<div></div>	
Tap  3 times	<div></div>	Get the second area that has <b>only one</b> intersection of $f(X)$ and the X-axis.

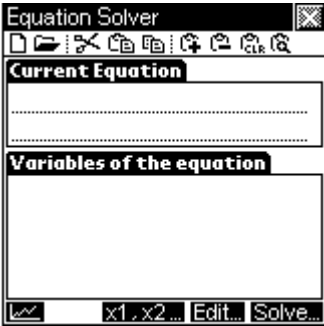
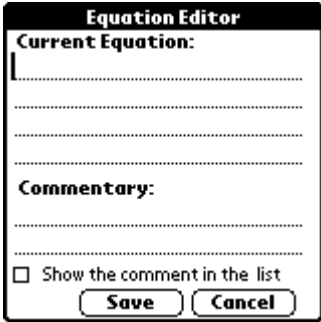

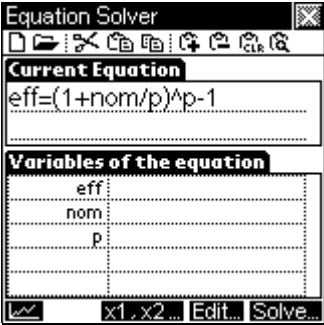
Keys/Actions:	Display:	Description:
<p>Tap 'Ok' to save X1 and X2 values for the solver and return to Main Form.</p> <p>Tap 'Solve...'</p> <p>Tap 'Ok'</p>	   	<p>Now you are ready to start calculation for the second answer. Actually you just saved the guesses to find the second answer. To look at them, tap 'x1, x2...'.</p> <p>Performing calculation</p> <p>Get the second answer.</p>

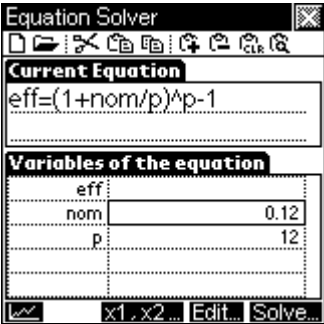
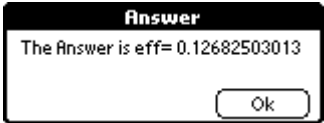
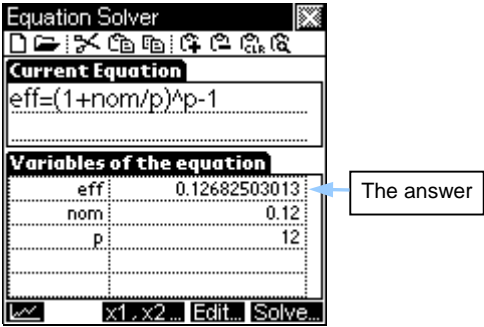
### Formula.

Suppose you are offered 12% compounded monthly. What is the effective rate?

The formula to calculate an effective rate is

$$eff = \left(1 + \frac{nom}{p}\right)^p - 1.$$

Keys/Actions:	Display:	Description:
<p>Tap 'Edit' to get equation editor or '□' to create new one.</p> <p>Enter the equation <math>\text{eff}=(1+\text{nom}/p)^p-1</math>, a commentary: "Effective rate", mark the check-box "Show the comment in the list"</p> <p>Tap 'Save' to store the equation, go to Main Form and get variables list.</p>	   	<p>Let's start with a new clear list.</p> <p>Go to Equation Editor, to enter a new equation.</p>



Keys/Actions:	Display:	Description:
<p>Enter nominal interest rate (nom) and number of periods (p) according to given problem.</p> <p>Tap 'Solve.'</p>	<div>  </div>	<p>nom=0.12 is 12% nominal interest rate. p=12 is number of periods (compounded monthly)</p> <p>Calculate the answer.</p> <p>Notice this answer was calculated directly. There was no “Please, wait ...” window.</p>

## Trigonometry.

Choose 'Trigonometry' in category menu.

sin	cos	tan	
asin	acos	atan	
sinh	cosh	tanh	NEXT ▶

asinh	acosh	atanh	PREV ◀

C4Finance gives you the ability to work with basic trigonometric and hyperbolic functions. You can use them in expressions, equations and formulas. Before using these functions set "Trigonometry Mode" in the application menu ( or  → Options → Trigonometry Mode...) to either "Radians" or "Degrees".

Trigonometric functions.

**sin**, sin(x)      sine.  
sin(45)=0.70711

**cos**, cos(x)      cosine.  
cos(0)=1

**tan**, tan(x)      tangent.  
tan(20)=0.36397

**asin**, asin(x)      arcsine.  
asin(0.3)=17.4576

**acos**, acos(x)      arccosine.  
acos(0.25)=75.52249

**atan**, atan(x)      arctangent.  
atan(0.1)=5.71059



**sinh**,  $\sinh(x)$       hyperbolic sine.  
 $\sinh(0.6)=0.63665$

**cosh**,  $\cosh(x)$       hyperbolic cosine.  
 $\cosh(2)=3.7622$

**tanh**,  $\tanh(x)$       hyperbolic tangent.  
 $\tanh(2)=0.96403$

**asinh**,  $\operatorname{asinh}(x)$       hyperbolic arcsine.  
 $\operatorname{asinh}(14)=3.33348$

**acosh**,  $\operatorname{acosh}(x)$       hyperbolic arccosine.  
 $\operatorname{acosh}(27)=3.98864$

**atanh**,  $\operatorname{atanh}(x)$       hyperbolic arctangent.  
 $\operatorname{atanh}(0.5)=0.54931$

## Contacting C4Finance developers

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- **Web:** [www.c4calc.com](http://www.c4calc.com)
- **Email:** [c4@perm.raid.ru](mailto:c4@perm.raid.ru)
- **Mail:** Box 7360, Perm, Russia 614083.

## Credits.

---

**Dmitri Vokhmine** - project manager, interface, financial calculations, user's guide.  
**Evgueni Kholzakov** – calculator's engine, equation solver, math functions.

## Special thanks.

---

**Macdonald R. Phillips**  
**Gary Kinsman**

# Index

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## A

abs, 23  
 Accelerated Cost Recovery System, 41  
 acos, 88  
 acosh, 89  
 ACRS, 44  
 addition, 9  
 amortization schedule, 27  
 answer is a break point, 80  
 answer is a solution, 80  
 asin, 88  
 asinh, 89  
 atan, 88  
 atanh, 89

## B

balance column, 27  
 Beginning Date, 68, 73, 75  
 binomcdf, 65  
 binompdf, 64  
 bonds, 37, 39  
 breakeven, 47

## C

C4Finance developers, 2, 4, 90  
 Calculation Log, 6  
 Cash Flow, 3, 6, 21, 30, 31, 32, 34  
 category menu, 14, 22, 24, 52, 55, 67, 76, 88  
 cbrt, 22  
 chg%n, 52  
 chg%o, 52  
 chg%p, 52  
 chi2cdf, 64  
 chi2pdf, 63  
 clipboard content, 8, 9, 10  
 clipboard controls, 16  
 copy, 14, 16, 18, 68, 72, 80  
 correlation coefficient, 6, 60  
 cos, 88  
 cosh, 89  
 cube root, 22  
 curve-fitting model, 57, 58, 59  
 cut, 14, 18

## D

damages, 2  
 define guesses, 80  
 depreciation, 41, 42, 43, 45  
 direct solution, 79  
 division, 22

## E

edit field number, 13  
 editing, 6, 8, 14  
 Ending Date, 68, 73, 75  
 Equation Editor, 4, 61, 76, 77, 78, 82, 86  
 Equation Solver, 4, 6, 14, 17, 61, 76, 79, 80, 81  
 exp, 22  
 export, 17

## F

face value, 36, 37  
 factorial, 23  
 final balance, 28  
 financial calculations, 90  
 fonts, 19  
 formula, 78, 85  
 fpart, 23  
 fractional, 23, 57  
 function pad, 14  
 function step, 19  
 Future Value, 24

## G

gamma, 23  
 gamma function, 23  
 Graffiti, 2, 7, 18  
 Graphics Explorer, 4, 6, 20, 61, 76, 78, 80, 83  
 guess, 33, 34, 78

## H

hypot, 13, 23

## I

initial guess, 78  
 Integer, 23  
 interest period, 37

interest rate conversion, 46  
 Internal Rate of Return, 30  
 invnormcdf, 62  
 ipart, 23  
 IRR, 30, 32, 33, 34, 35  
 iterative solution, 79

## L

LFDY, 41  
 ln, 22  
 log, 3, 5, 8, 18, 22  
 log2, 22  
 logarithm, 22  
 long math expressions, 18

## M

math, 10, 90  
 maturity date, 38, 40  
 maximized edit field, 18  
 maximum, 29, 55  
 mc%c, 53  
 mc%m, 53  
 mc%p, 53  
 mean, 55, 61, 62, 81  
 median, 55  
 MemoPad, 17  
 minimum, 55  
 mod, 23  
 mode, 8, 55  
 mp%c, 54  
 mp%m, 53, 54  
 mp%p, 54  
 multiple edit fields, 6  
 multiplication, 22

## N

Net Future Value, 30  
 Net Uniform Series, 30  
 NFV, 30, 34, 35  
 nominal annual interest rate, 24  
 normcdf, 62  
 normpdf, 61  
 NPV, 30, 34, 35, 47  
 NUS, 30

## O

on-screen keyboard, 18  
 order of calculations, 68

## P

Partial-Year Depreciation, 45  
 paste, 16, 18  
 percent key, 3, 12  
 periodic interest rate, 32, 50, 51  
 poissoncdf, 66  
 poissonpdf, 65, 66  
 power, 55  
 prediction, 55, 57, 60  
 preferences, 14, 19, 21  
 Present Value, 24

## R

range, 19, 27, 28, 35, 55, 78, 80  
 real calendar, 67  
 recip, 22  
 reciprocal, 22  
 regression models, 6, 55  
 regular edit field, 8, 18  
 representation look, 68  
 round, 23

## S

saving your data, 21  
 settlement date, 38, 40  
 sin, 88  
 Single Payment Future Value, 4, 50  
 Single Payment Present Value, 4, 50  
 sinh, 89  
 solution, 35, 78, 79, 80, 81  
 solve, 6, 35  
 spfv, 50  
 sppv, 50  
 sqrt, 22  
 square, 11, 22  
 square root, 11, 22  
 standard deviation, 55, 61, 62  
 standard deviation of a discrete random variable, 55  
 statistics, 55  
 subtraction, 9, 22, 72  
 sum of squares, 55

## T

tan, 88  
 tanh, 89  
 tcdf, 63  
 Time Value of Money, 3, 6, 21, 24, 25  
 total amount of the cash flows, 30

total number of items, 55  
totl%p, 52, 53  
totl%pr, 52  
totl%t, 53  
tpdf, 62, 63  
trial and error method, 35  
TVM, 24, 26, 30

## U

UDM, 21  
Uniform Series Future Value, 4, 51  
Uniform Series Present Value, 4, 50  
uninstall, 21  
unit price, 47  
User Data Manager, 3, 21, 25, 26, 32, 57  
usfv, 51

uspv, 50

## W

warranty, 2  
weighted mean, 55  
worksheet name, 21

## X

X scale, 20  
x!, 23

## Y

Y scale, 20  
yield to maturity, 37