

Chapter 3 / **Example 44****Determining the equation of a polynomial**

<You can use your GDC in two different ways to solve this type of problem. Using your GDC to solve the three linear equations or finding the regression equation of a curve which passes through three points.

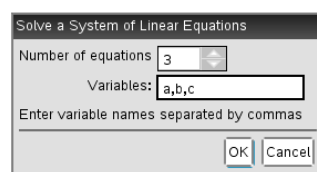
Find the equation of a quadratic function  $f(x) = ax^2 + bx + c$  that passes through the points  $(-1, 10)$ ,  $(2, -2)$  and  $(4, 0)$ .

Open a new document and add a Calculator page.

Press **menu** 3:Algebra | 2:Solve System of Linear Equations...

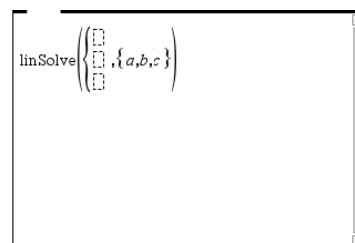
Change the defaults to 3 equations with variables  $a$ ,  $b$ ,  $c$

Press **enter**.



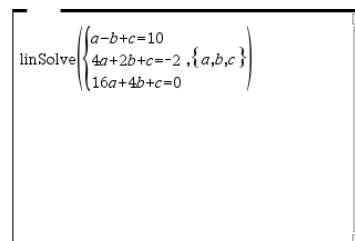
Solve the equations 
$$\begin{cases} a - b + c = 10 \\ 4a + 2b + c = -2 \\ 16a + 4b + c = 0 \end{cases}$$

The template has places to type the two equations.



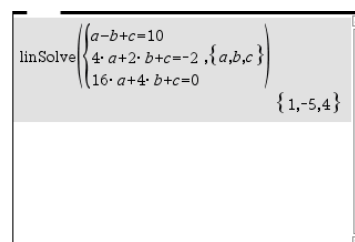
Type the equations into the template.

Press **enter**.



The calculator displays the solution  $a = 1$ ,  $b = -5$ ,  $c = 4$

$\Rightarrow f(x) = x^2 - 5x + 4$



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Use the coordinates of the three points  $(-1, 10)$ ,  $(2, -2)$  and  $(4, 0)$ .

Add a new Lists & Spreadsheet page to your document by pressing **ctrl** **doc** **(+page)** 4: Add Lists & Spreadsheet.

Type 'x' in the first cell.

Enter the x-coordinates of the three points in the first column.

Press **enter** or **▼** after each number to move to the next cell.

A	x	B	C	D
=				
1		-1		
2		2		
3		4		
4				
5				

Type 'y' in the cell to the right of 'x'.

Enter the y-coordinates in the second column.

Use the **▲ ▼ ► ◀** keys on the touchpad to navigate the spreadsheet.

A	x	B	y	C	D
=					
1		-1	10		
2		2	-2		
3		4	0		
4					
5					

To calculate the equation of the regression line

Press **menu** 4: Statistics | 1: Stat Calculations | 6: Quadratic Regression...

Open the drop down lists with **►** and select using **▼** and **enter**

Choose 'x' for X List and 'y' for Y List and leave the remaining fields unchanged.

Click the touchpad on OK or press **enter**

Quadratic Regression

X List: x

Y List: y

Save RegEqn to: f1

Frequency List: 1

Category List:

Include Categories:

OK Cancel

The calculator displays the solution  $a = 1$ ,  $b = -5$ ,  $c = 4$

$$\Rightarrow f(x) = x^2 - 5x + 4$$

A	x	B	y	C	D
=					=QuadRe
1		-1	10	Title	Quadrat...
2		2	-2	RegEqn	a*x^2+b...
3		4	0	a	1.
4				b	-5.
5				c	4.

D1 = "Quadratic Regression"