Chapter 10 / **Example 2**

Graphing a function and its derivative

For each of the functions below:

i find $f'(x)$

ii find the gradient of the curve at the point where $x = 2$

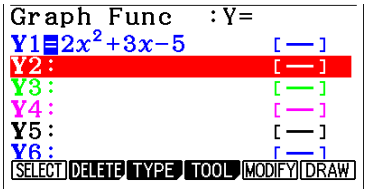
iii sketch the graph of the function and its derivative on the same axes

iv write down the set of values of x for which the function is increasing.

a $f(x) = 2x^2 + 3x - 5$ **b** $f(x) = \frac{2}{x} + x, x \neq 0$

Press MENU 5 GRAPH to display the equation entry screen.

Type $2x^2 + 3x - 5$ and press EXE to enter the equation as Y1.



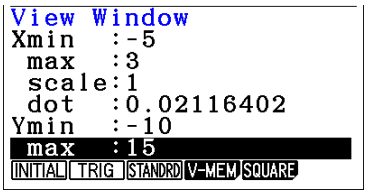
For a better view of the curve, adjust the window.

Press SHIFT F3 V-WIN.

Set the axes to show $-5 \leq x \leq 3$ with a scale of 1 and $-10 \leq y \leq 15$ with a scale of 2

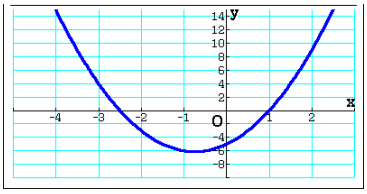
Leave the remaining items unchanged.

Press EXIT when you have finished.



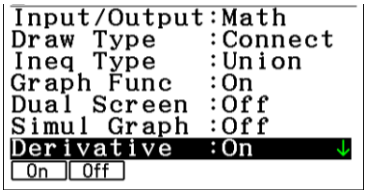
Press F6 DRAW to display the graph screen

The GDC now displays the quadratic function $Y1 = 2x^2 + 3x - 5$ in a suitable window.



Press EXIT then press SHIFT MENU SET UP.

Scroll down to Derivative with ▼ and use F1 to set this to 'On'. Press EXIT to return to the equation entry screen and F6 DRAW to return to the graph.

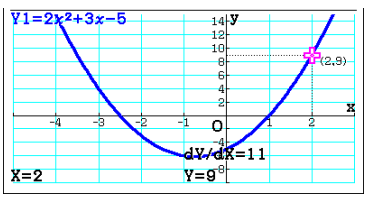


To find the gradient at $x = 2$ press F1 Trace

Type 2, the value of the x-coordinate, and press EXE.

The GDC displays a point on $f\ x\ = 3x^2 - 2$ and the gradient of the curve at that point.

$f'\ 1\ = 6$.



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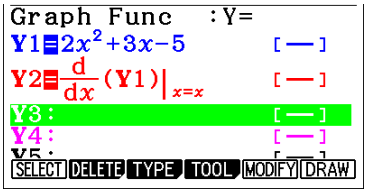
Graphing a function and its derivative

To display the derivative, press EXIT then press OPTN, F2 CALC, F1 d/dx

The template has spaces for the function and the value that it is evaluated at.

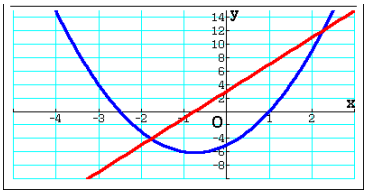
Enter the function Y1 by pressing F1 Y and typing 1

Type x and press EXE.



Press F6 DRAW to display the graph screen.

The GDC displays the graph of Y1 and its derivative.

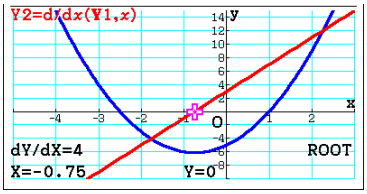


To find where the function is increasing, either find its minimum value of the zero of the derived function.

To find the zero press F5 G-SOLVE and then press F1 ROOT.

Select Y2 using ▲ and press EXE.

The GDC shows the first zero.

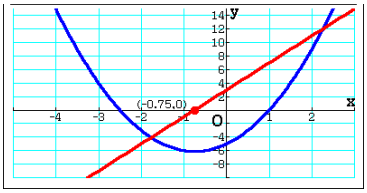


Press EXE to show the coordinates.

Press EXIT to leave G-Solv mode and F6 DRAW to display the graph screen again.

The zero of $f'(x)$ is at $-0.75, 0$

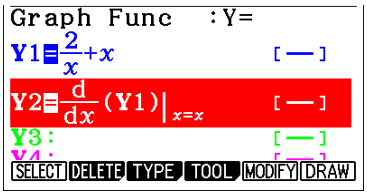
The function is increasing where $x > -0.75$.



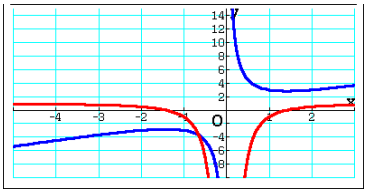
Press EXIT to return to the equation entry screen.

Press F6 DELETE F1 to delete the formula in F1.

Type $\frac{2}{x} + x$ using the fraction template and press EXE.



Press F6 DRAW to display the new function and its derivative.



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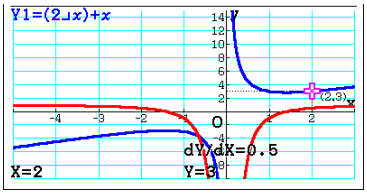
Graphing a function and its derivative

Find the gradient at the point where $x = 2$. $f'(2) = 0.5$	
Find the maximum and minimum points. $f(x)$ has a maximum and minimum point at (−1.41, −2.83) and (1.41, 2.83). The function is increasing when $x < -1.41$ and $x > 1.41$