

# CAMBRIDGE TECHNOLOGY IN MATHS

## *Year 11*

### More functions

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**Cambridge University Press**

**Example: Graphs of cubic functions**

Sketch the graph of  $y = x^3 + 2x^2 - 5x - 6$ .

**Solution**

$$P(0) = -6$$

$\therefore$  y-intercept is  $-6$ .

Let  $P(x) = x^3 + 2x^2 - 5x - 6$

$$P(1) = 1 + 2 - 5 - 6 \neq 0$$

$$P(-1) = -1 + 2 + 5 - 6 = 0$$

$\therefore (x + 1)$  is a factor.

By division

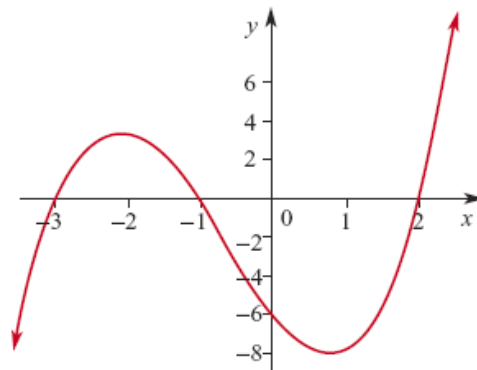
$$y = (x + 1)(x - 2)(x + 3)$$

$$\text{For } (x + 1)(x - 2)(x + 3) = 0$$

$$x + 1 = 0 \quad \text{or} \quad x - 2 = 0 \quad \text{or} \quad x + 3 = 0$$

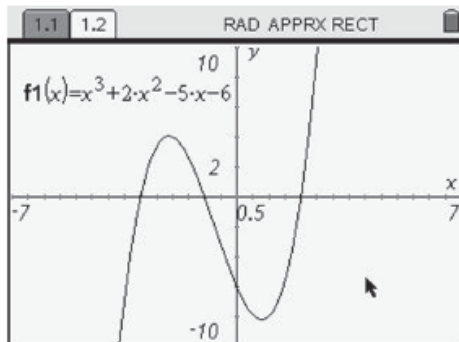
$$\therefore x = -1, 2 \text{ or } -3$$

$\therefore$  x-intercepts are  $-1, 2$  and  $-3$ .



Using the TI-Nspire:

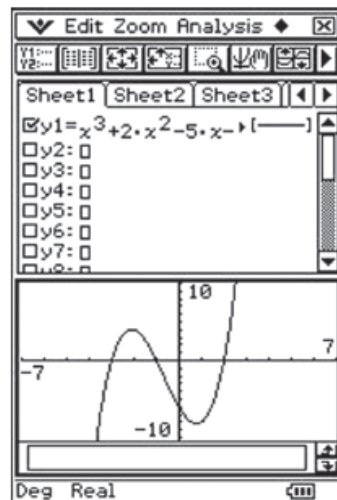
- 1 Enter  $x^3 + 2x^2 - 5x - 6$  into  $f1(x)$  and choose a suitable window.



- 2 Press  $\text{MENU}$  and select *Graph Trace* from the Trace submenu.

Using the ClassPad:

- 1 Enter  $x^3 + 2x^2 - 5x - 6$  into  $y1$  and press  $\text{EXE}$ .
- 2 Tap  $\text{A/B}$  and choose a suitable window.

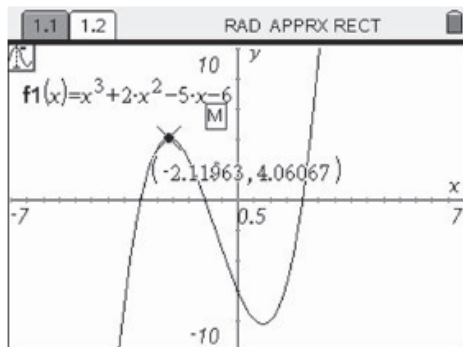


Original location: Ch 6 Example 14 (p.327-328)

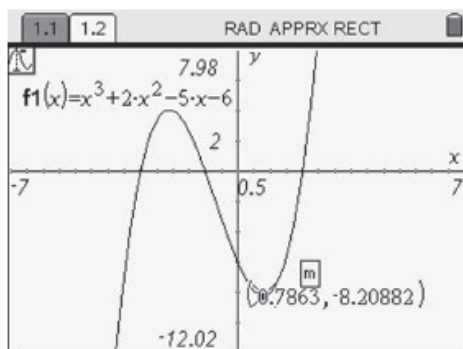
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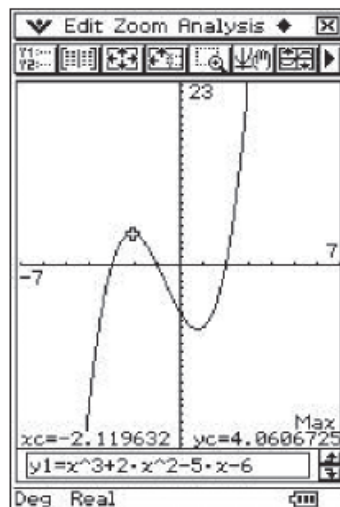
- 3 Tap the left and right buttons and move the cursor to the maximum until **M** is displayed on the screen.



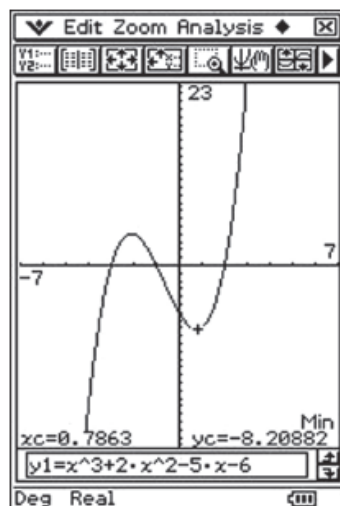
- 4 Move the cursor to the minimum until **m** is displayed on the screen.



- 3 To display the coordinates of the maximum, tap Analysis and select *Max* from the G-Solve submenu.



- 4 To display the coordinates of the minimum, tap Analysis and select *Min* from the G-Solve submenu.



Original location: Ch 6 Example 14 (p.327-328)

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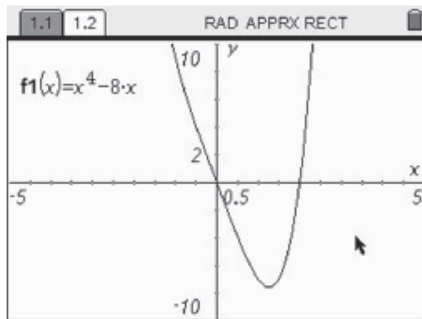
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### Example: Graphs of quartic functions

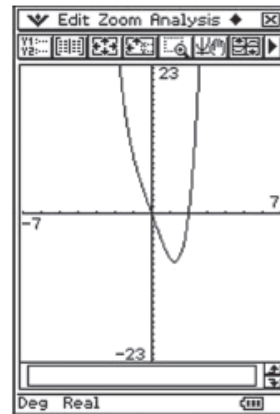
Use a graphics calculator to graph each of the following quartic equations:

a  $f(x) = x^4 - 8x$     b  $f(x) = 2x^4 - 8x^2$     c  $f(x) = \frac{1}{2}(x^4 - 2x^3 - 24x^2)$

a Using the TI-Nspire:



a Using the ClassPad:

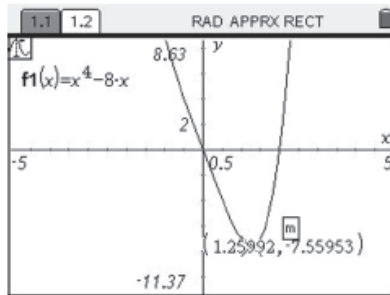


Original location: Ch 6 Example 19 (p.332-334), Ex 6G Q2 (p.335)

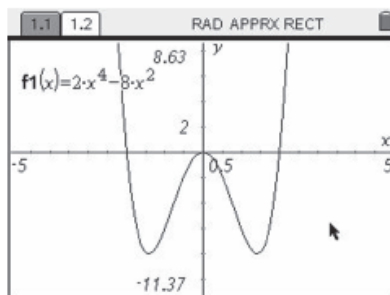
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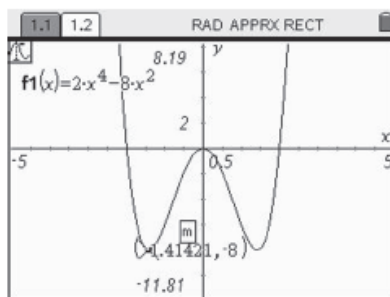
This is done through *Graph Trace* from the Trace menu.



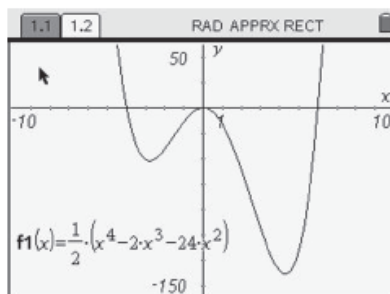
b Using the TI-Nspire:



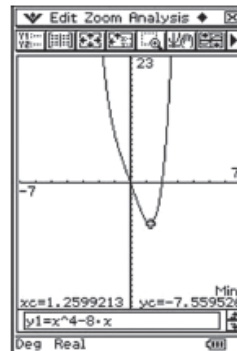
This is done through *Graph Trace* from the Trace menu.



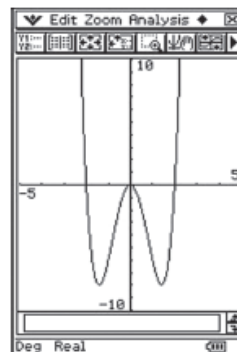
c Using the TI-Nspire:



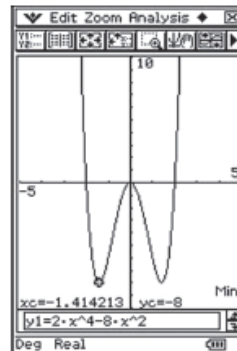
This is done using *Min* from the G-Solve submenu.



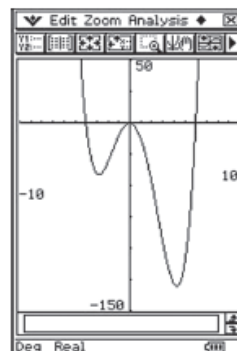
b Using the ClassPad:



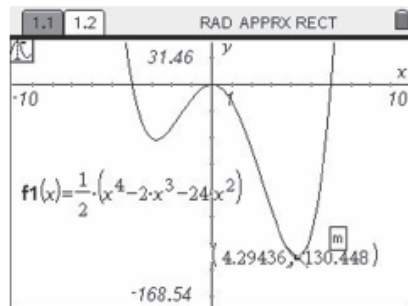
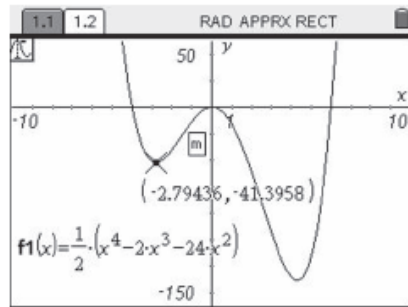
This is done using *Min* from the G-Solve submenu.



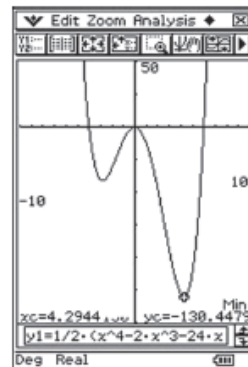
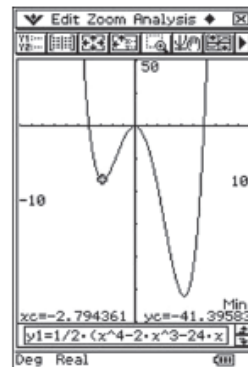
c Using the ClassPad:



This is done through *Graph Trace* from the Trace menu.



This is done using *Min* from the G-Solve submenu.



## Questions on graphing functions using a CAS calculator

- 2 Use a graphics calculator to help draw the graphs of each of the following. Give  $x$ -axis intercepts and coordinates of turning points. (Values of coordinates of turning points are to be given correct to 2 decimal places.)

a  $y = x^4 - 125x$

c  $y = x^4 + 27x$

e  $y = x^4 - 25x^2$

g  $y = x^4 - 81x^2$

i  $y = x^4 - 9x^3 + 20x^2$

k  $y = (x - 2)(x^2 + 2x + 10)$

b  $y = (x^2 - x - 20)(x^2 - 2x - 24)$

d  $y = x^4 - 4x^3$

f  $y = 16 - x^4$

h  $y = x^4 - 7x^3 + 12x^2$

j  $y = (x^2 - 16)(x^2 - 25)$

l  $y = (x + 4)(x^2 + 2x - 35)$

Original location: Ch 6 Example 19 (p.332-334), Ex 6G Q2 (p.335)

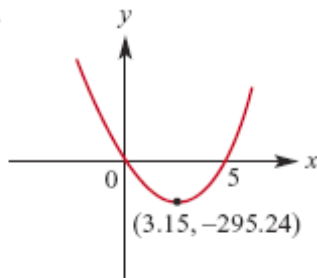
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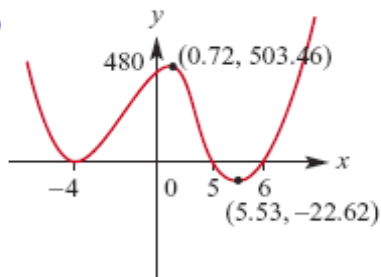
## Answers

### Function graphing questions

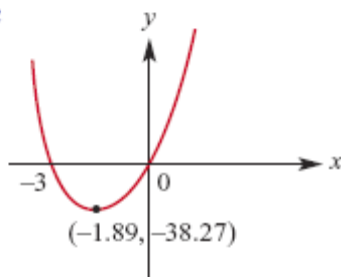
2 a



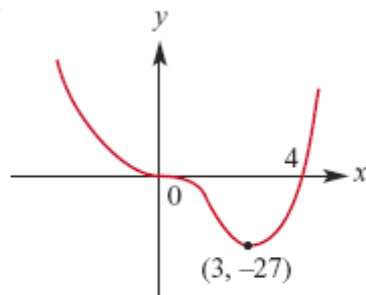
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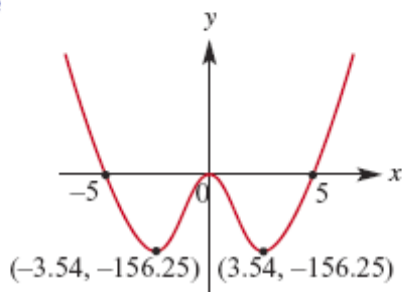
c



d



e

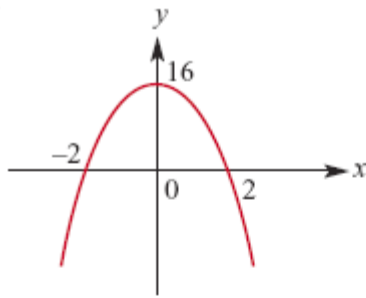


Original location: Answers (p.602-603)

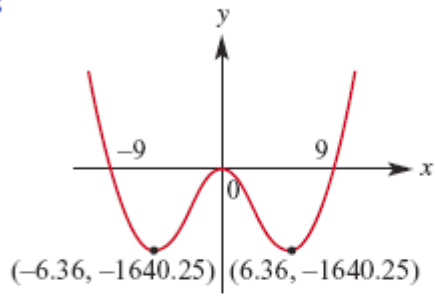
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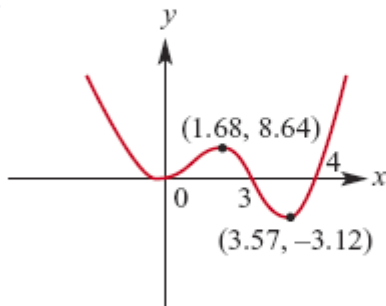
f



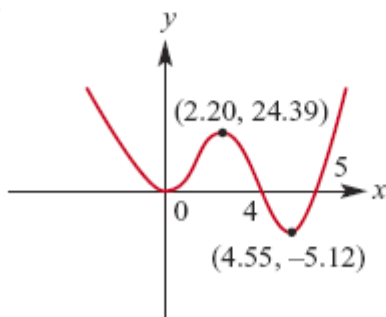
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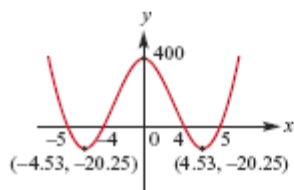
h



i



j

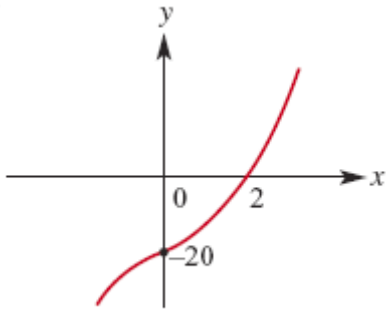


Original location: Answers (p.602-603)

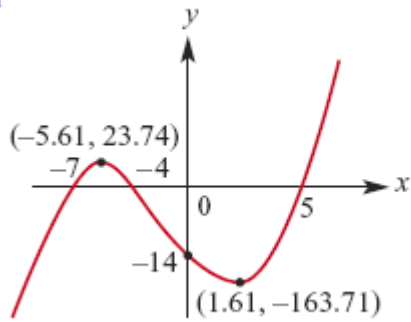
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Original location: Answers (p.602-603)

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