

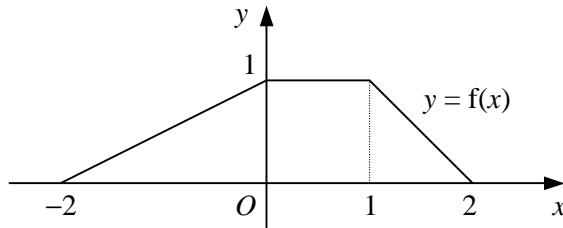
- 1 a Solve the simultaneous equations

$$y = 3x - 4$$

$$y = 4x^2 - 9x + 5 \quad (4)$$

- b Hence, describe the geometrical relationship between the straight line $y = 3x - 4$ and the curve $y = 4x^2 - 9x + 5$. (1)

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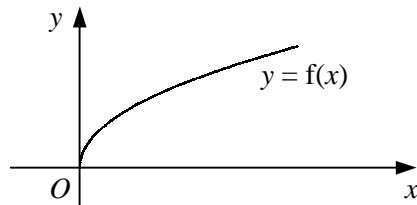


The diagram shows the graph of $y = f(x)$ which is defined for $-2 \leq x \leq 2$.

Labelling the axes in a similar way, sketch on separate diagrams the graphs of

- a $y = 3f(x)$, (2)
 b $y = f(x + 1)$, (2)
 c $y = f(-x)$. (2)
- 3 a Show that the line $y = 4x + 1$ does not intersect the curve $y = x^2 + 5x + 2$. (4)
 b Find the values of m such that the line $y = mx + 1$ meets the curve $y = x^2 + 5x + 2$ at exactly one point. (4)

4



The diagram shows the curve with the equation $y = f(x)$ where

$$f(x) \equiv \sqrt{x}, \quad x \geq 0.$$

- a Sketch on the same set of axes the graphs of $y = 1 + f(x)$ and $y = f(x + 3)$. (4)
 b Find the coordinates of the point of intersection of the two graphs drawn in part a. (4)
- 5 The curve C has the equation $y = x^2 + kx - 3$ and the line l has the equation $y = k - x$, where k is a constant.
 Prove that for all real values of k , the line l will intersect the curve C at exactly two points. (7)

6

$$f(x) \equiv 2x^2 - 4x + 5.$$

- a Express $f(x)$ in the form $a(x + b)^2 + c$. (3)
 b Showing the coordinates of the turning point in each case, sketch on the same set of axes the curves
 i $y = f(x)$,
 ii $y = f(x + 3)$. (4)

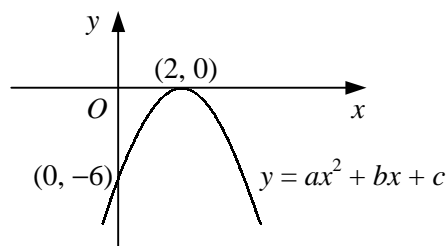
- 7 a Sketch on the same diagram the straight line $y = 2x - 5$ and the curve $y = x^3 - 3x^2$, showing the coordinates of any points where each graph meets the coordinate axes. (4)

- b Hence, state the number of real roots that exist for the equation

$$x^3 - 3x^2 - 2x + 5 = 0,$$

giving a reason for your answer. (2)

8



The diagram shows the curve with the equation $y = ax^2 + bx + c$.

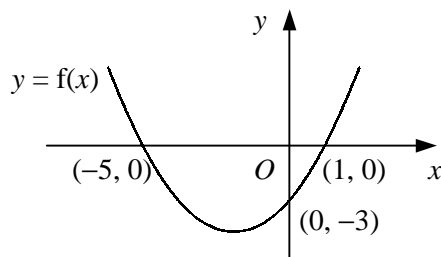
Given that the curve crosses the y -axis at the point $(0, -6)$ and touches the x -axis at the point $(2, 0)$, find the values of the constants a , b and c . (6)

- 9 a Show that

$$(1 - x)(2 + x)^2 \equiv 4 - 3x^2 - x^3. \quad (3)$$

- b Hence, sketch the curve $y = 4 - 3x^2 - x^3$, showing the coordinates of any points of intersection with the coordinate axes. (3)

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The diagram shows the curve with equation $y = f(x)$ which crosses the coordinate axes at the points $(-5, 0)$, $(1, 0)$ and $(0, -3)$.

Showing the coordinates of any points of intersection with the axes, sketch on separate diagrams the curves

a $y = -f(x)$, (2)

b $y = f(x - 5)$, (2)

c $y = f(2x)$. (2)

- 11 a Describe fully the transformation that maps the graph of $y = f(x)$ onto the graph of $y = f(x + 1)$. (2)

- b Sketch the graph of $y = \frac{1}{x+1}$, showing the coordinates of any points of intersection with the coordinate axes and the equations of any asymptotes. (3)

- c By sketching another suitable curve on your diagram in part b, show that the equation

$$x^3 - \frac{1}{x+1} = 2$$

has one positive and one negative real root. (4)