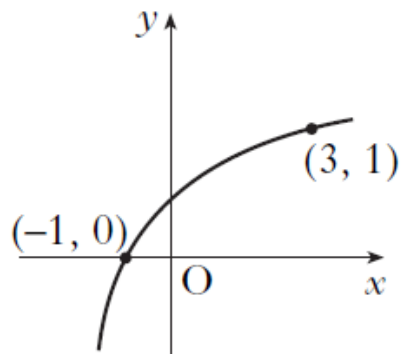
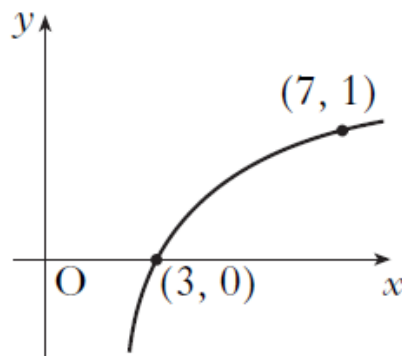


Which of the following graphs has equation  $y = \log_5(x - 2)$ ?

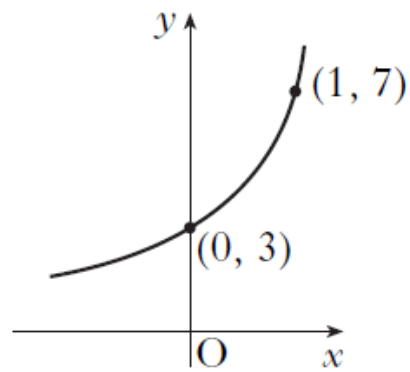
A



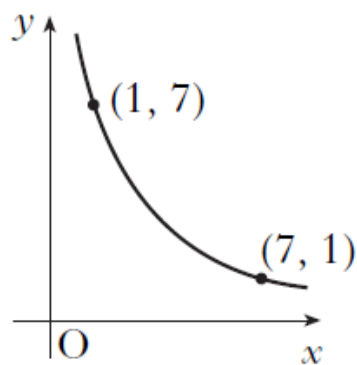
B



C

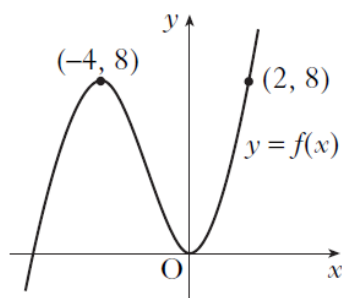


D



The diagram shows a sketch of the function  $y = f(x)$ .

- (a) Copy the diagram and on it sketch the graph of  $y = f(2x)$ . 2
- (b) On a separate diagram sketch the graph of  $y = 1 - f(2x)$ . 3



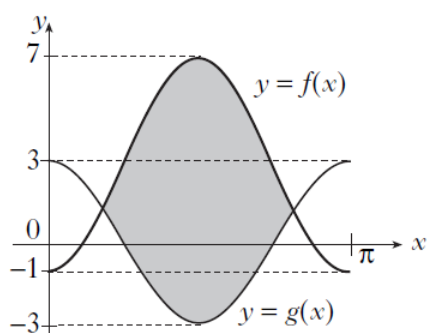
Functions  $f$  and  $g$  are given by  $f(x) = 3x + 1$  and  $g(x) = x^2 - 2$ .

- (a) (i) Find  $p(x)$  where  $p(x) = f(g(x))$ . 3
- (ii) Find  $q(x)$  where  $q(x) = g(f(x))$ . 3
- (b) Solve  $p'(x) = q'(x)$ . 3

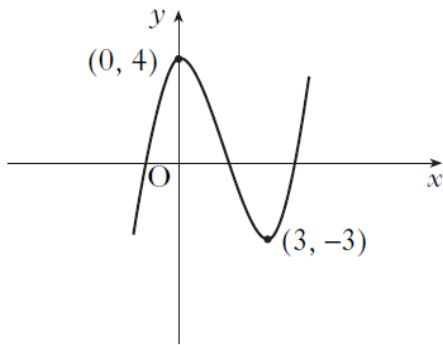
The graphs of  $y = f(x)$  and  $y = g(x)$  are shown in the diagram.

$f(x) = -4 \cos(2x) + 3$  and  $g(x)$  is of the form  $g(x) = m \cos(nx)$ .

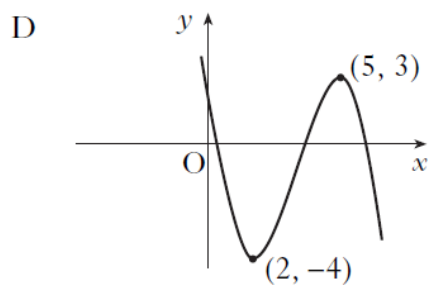
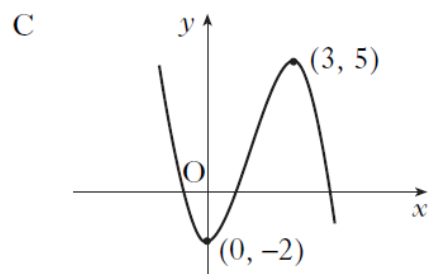
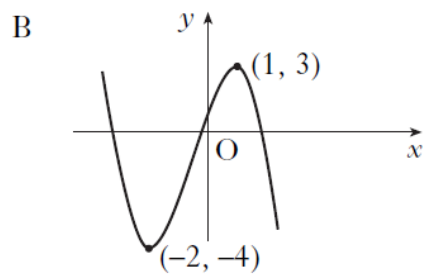
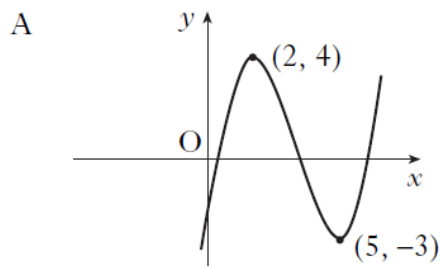
- (a) Write down the values of  $m$  and  $n$ . 1
- (b) Find, correct to one decimal place, the coordinates of the points of intersection of the two graphs in the interval  $0 \leq x \leq \pi$ . 5
- (c) Calculate the shaded area. 6



The diagram shows part of the graph of a function with equation  $y = f(x)$ .

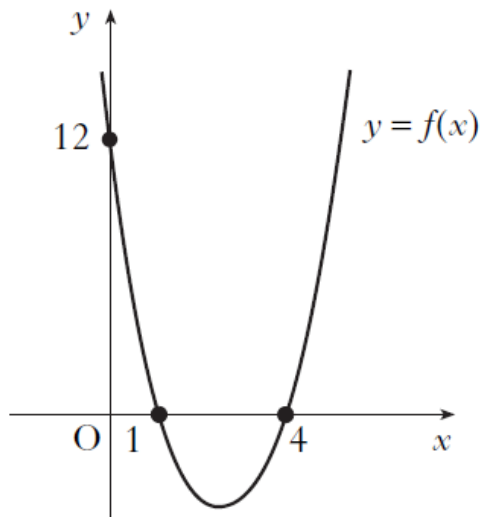


Which of the following diagrams shows the graph with equation  $y = -f(x - 2)$ ?



The diagram shows part of the graph of a quadratic function  $y = f(x)$ .

The graph has an equation of the form  $y = k(x - a)(x - b)$ .



What is the equation of the graph?

- A  $y = 3(x - 1)(x - 4)$
- B  $y = 3(x + 1)(x + 4)$
- C  $y = 12(x - 1)(x - 4)$
- D  $y = 12(x + 1)(x + 4)$

$2x^2 + 4x + 7$  is expressed in the form  $2(x + p)^2 + q$ .

What is the value of  $q$ ?

- A 5
- B 7
- C 9
- D 11

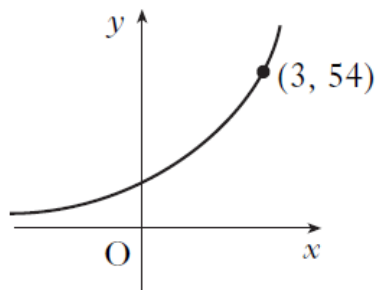
A function  $f$  is given by  $f(x) = \sqrt{9 - x^2}$ .

What is a suitable domain of  $f$ ?

- A  $x \geq 3$
- B  $x \leq 3$
- C  $-3 \leq x \leq 3$
- D  $-9 \leq x \leq 9$

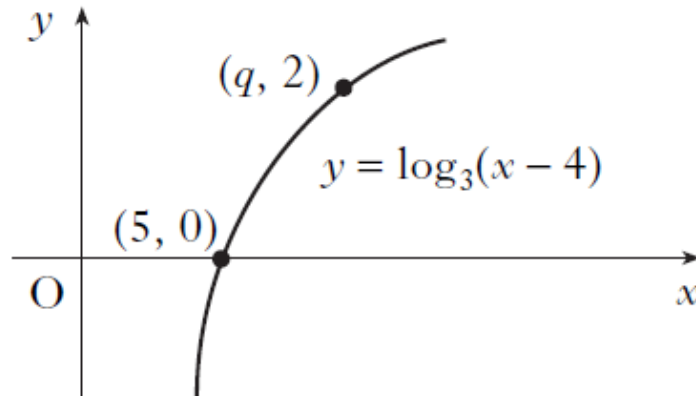
The diagram shows part of the graph whose equation is of the form  $y = 2m^x$ .

What is the value of  $m$ ?



- A 2
- B 3
- C 8
- D 18

The diagram shows part of the graph of  $y = \log_3(x - 4)$ .  
 The point  $(q, 2)$  lies on the graph.



What is the value of  $q$ ?

- A 6
- B 7
- C 8
- D 13

Functions  $f$ ,  $g$  and  $h$  are defined on suitable domains by

$$f(x) = x^2 - x + 10, g(x) = 5 - x \text{ and } h(x) = \log_2 x.$$

- (a) Find expressions for  $h(f(x))$  and  $h(g(x))$ . 3
- (b) Hence solve  $h(f(x)) - h(g(x)) = 3$ . 5

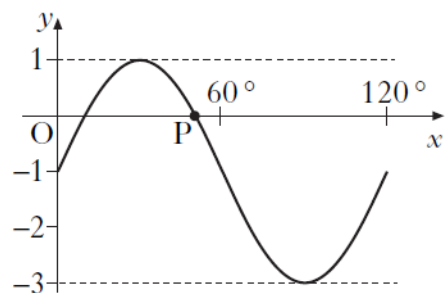
Functions  $f$  and  $g$ , defined on suitable domains, are given by  $f(x) = x^2 + 1$  and  $g(x) = 1 - 2x$ .

Find:

- (a)  $g(f(x))$ ; 2
- (b)  $g(g(x))$ . 2

The diagram shows part of the graph of a function whose equation is of the form  $y = a \sin(bx^\circ) + c$ .

- (a) Write down the values of  $a$ ,  $b$  and  $c$ .
- (b) Determine the exact value of the  $x$ -coordinate of P, the point where the graph intersects the  $x$ -axis as shown in the diagram.



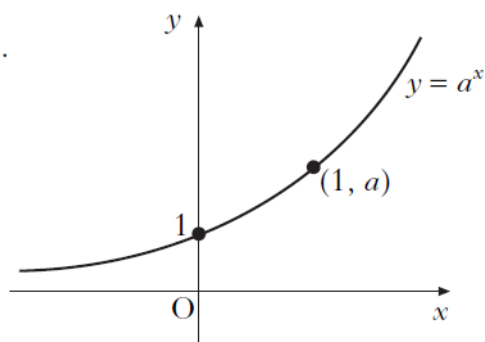
3

3

The diagram shows the graph of  $y = a^x$ ,  $a > 1$ .

On separate diagrams, sketch the graphs of:

- (a)  $y = a^{-x}$ ;
- (b)  $y = a^{1-x}$ .



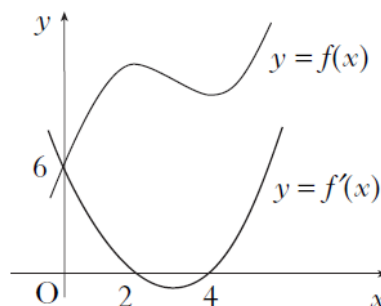
2

2

The diagram shows the graphs of a cubic function  $y = f(x)$  and its derived function  $y = f'(x)$ .

Both graphs pass through the point  $(0, 6)$ .

The graph of  $y = f'(x)$  also passes through the points  $(2, 0)$  and  $(4, 0)$ .



- (a) Given that  $f'(x)$  is of the form  $k(x - a)(x - b)$ :

- (i) write down the values of  $a$  and  $b$ ;
- (ii) find the value of  $k$ .

3

- (b) Find the equation of the graph of the cubic function  $y = f(x)$ .

4