

NON CALCULATOR SECTION

(35 mins)

- 1) The equation  $x^2 - 3x + k^2 = 4$  has two distinct real roots. Find the possible values of  $k$ .

[6 marks]

- 2) Let  $f(x) = 2x^2 - 8x - 9$ .

(a) (i) Write down the coordinates of the vertex.

(ii) Hence or otherwise, express the function in the form  $f(x) = 2(x - h)^2 + k$ . [4 marks]

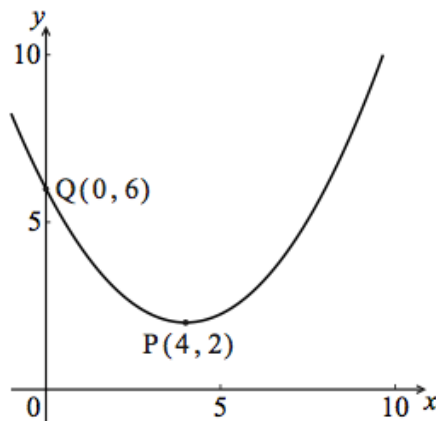
(b) Solve the equation  $f(x) = 0$ . [3 marks]

- 3) Let  $f(x) = 2x - 1$  and  $g(x) = 3x^2 + 2$ .

(a) Find  $f^{-1}(x)$ . [3 marks]

(b) Find  $(f \circ g)(1)$ . [3 marks]

- 4) Let  $f$  be a quadratic function. Part of the graph of  $f$  is shown below.



The vertex is at  $P(4, 2)$  and the  $y$ -intercept is at  $Q(0, 6)$ .

(a) Write down the equation of the axis of symmetry. [1 mark]

The function  $f$  can be written in the form  $f(x) = a(x - h)^2 + k$ .

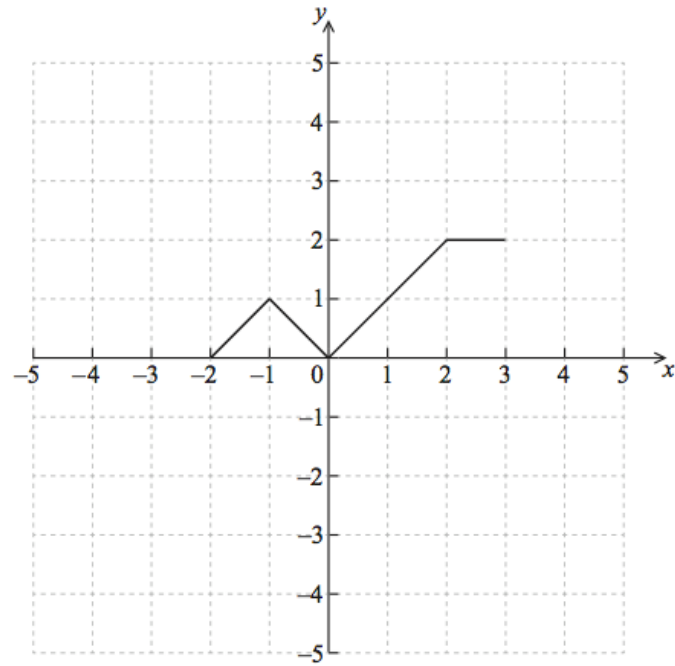
(b) Write down the value of  $h$  and of  $k$ . [2 marks]

(c) Find  $a$ . [3 marks]

## Functions test

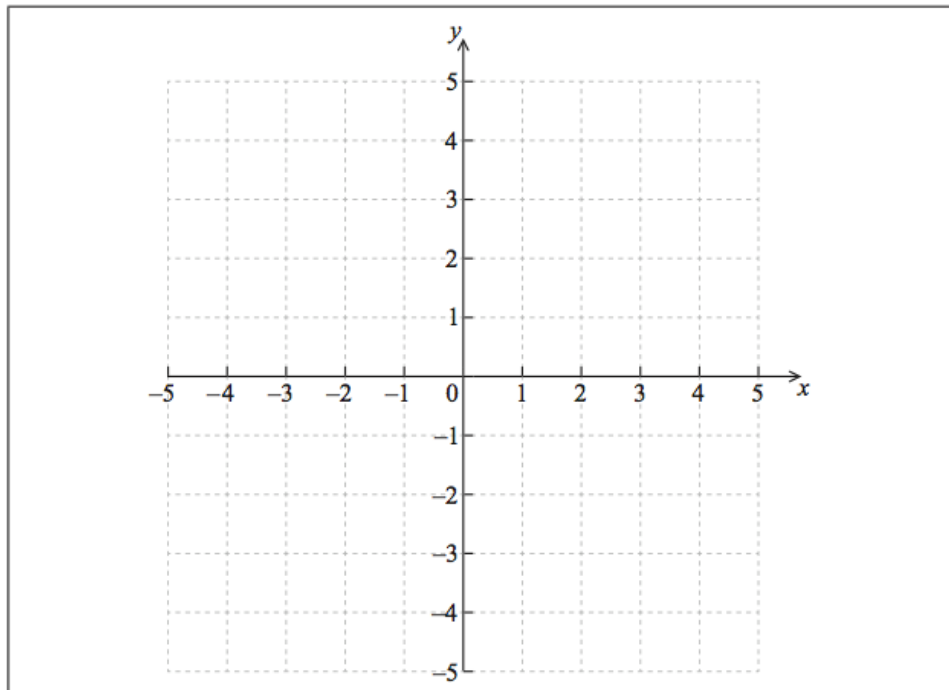
The diagram below shows the graph of a function  $f(x)$ , for  $-2 \leq x \leq 3$ .

5)



(a) Sketch the graph of  $f(-x)$  on the grid below.

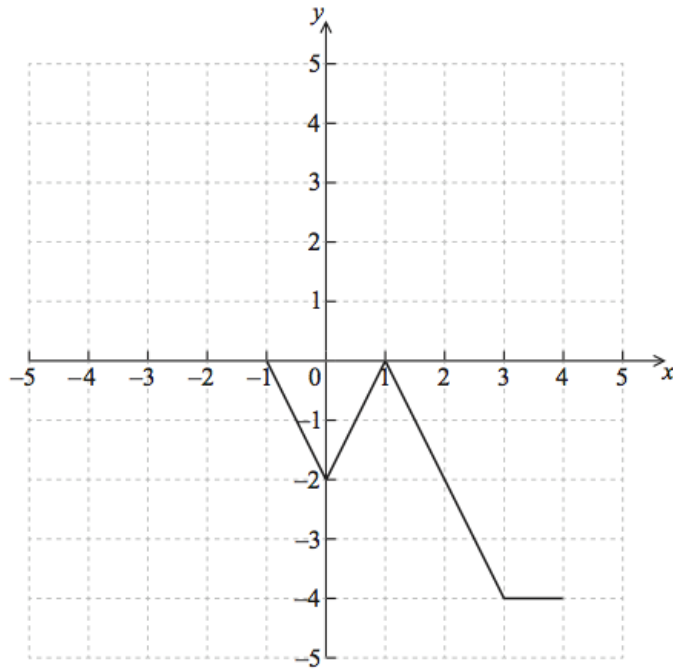
[2 marks]



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## Functions test

- (b) The graph of  $f$  is transformed to obtain the graph of  $g$ . The graph of  $g$  is shown below.



The function  $g$  can be written in the form  $g(x) = af(x+b)$ . Write down the value of  $a$  and of  $b$ .

[4 marks]

Functions test

CALCULATOR SECTION

(20 min)

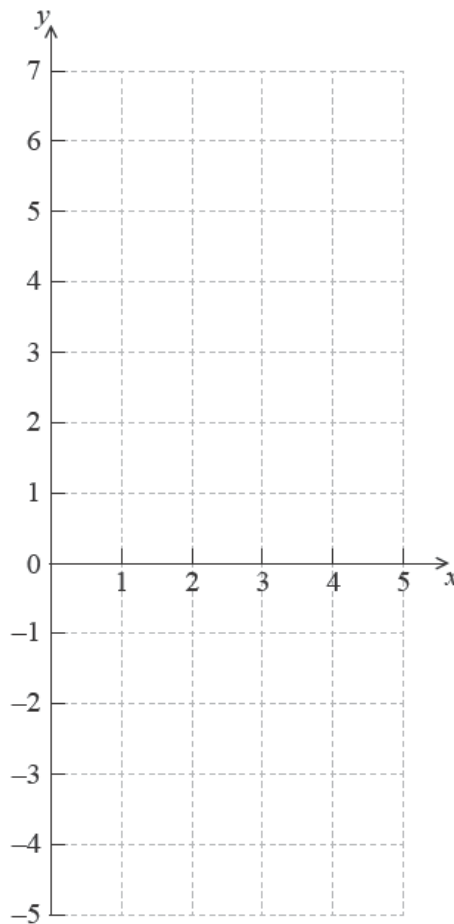
6) Let  $f(x) = 4x - e^{x-2} - 3$ , for  $0 \leq x \leq 5$ .

(a) Find the  $x$ -intercepts of the graph of  $f$ .

[3 marks]

(b) On the grid below, sketch the graph of  $f$ .

[3 marks]



7) Let  $h(x) = \frac{2x-1}{x+1}$ ,  $x \neq -1$ .

(a) Find  $h^{-1}(x)$ .

[4 marks]

(b) (i) Sketch the graph of  $h$  for  $-4 \leq x \leq 4$  and  $-5 \leq y \leq 8$ , including any asymptotes.

(ii) Write down the equations of the asymptotes.

(iii) Write down the  $x$ -intercept of the graph of  $h$ .

[7 marks]