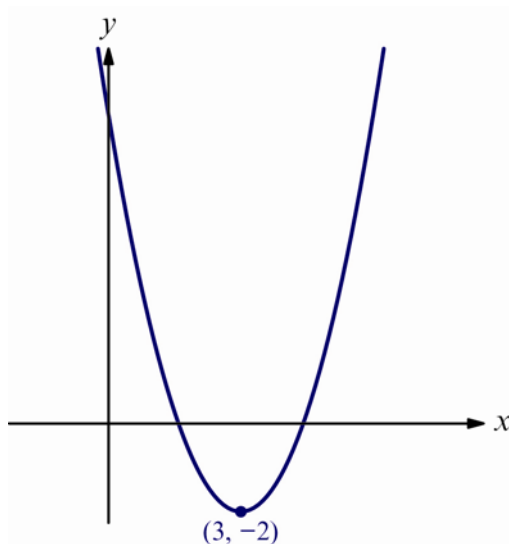


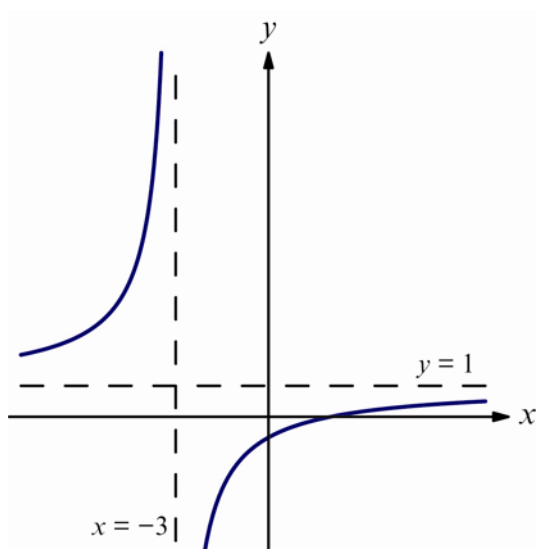
## Self-assessment: 5 The theory of functions

1. Write down the domain and range for the functions represented by the following graphs:

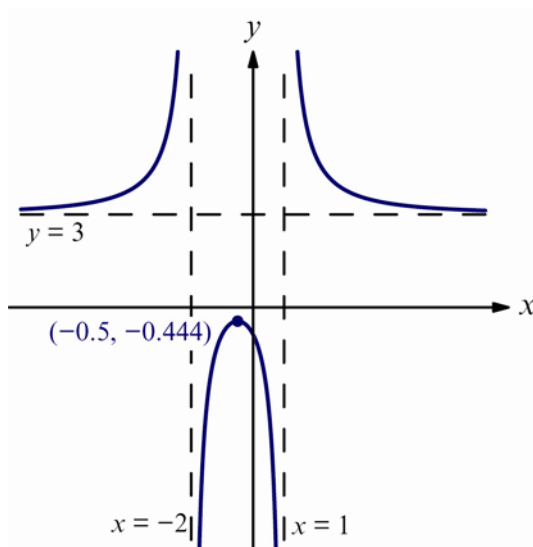
(a)



(b)



(c)



[7 marks]

2. A function is given by  $f : x \mapsto \ln(3x - 2)$ ,  $x > \frac{2}{3}$ . Find an expression for  $f^{-1}(x)$ .

*(accessible to students on the path to grade 3 or 4) [3 marks]*

3. Do not use a calculator to answer this question.

Given that  $f(x) = 2x^2 - 11$  and  $g(x) = x + 2$ , solve the equation  $fg(x) = 2x$ .

*(accessible to students on the path to grade 5 or 6) [5 marks]*

**4. Do not use a calculator to answer this question.**

A function is defined by  $f(x) = \frac{3x-a}{x-b}$ .

- (a) State, in terms of  $a$  and  $b$ ,
  - (i) The  $x$ - and  $y$ -intercepts of  $y = f(x)$ .
  - (ii) The equations of the asymptotes of the graph  $y = f(x)$ .
  - (iii) The range of  $f(x)$ .
- (b) Solve the equation  $f(x) = 2$ .

*(accessible to students on the path to grade 3 or 4)*

- (c) Find an expression for  $f^{-1}(x)$  and state its domain.
- (d) Find the value of  $b$  for which  $f(x)$  is a self-inverse function.

*(accessible to students on the path to grade 5 or 6)*

*[15 marks]*