

### Function Operations

Answer on loose leaf paper in pen, or, for the graphs, on graph paper in pencil.  
Show working for all problems.

1. For the function  $f(x) = 2x - 7$ 
  - (a) What is the value of  $f(3)$ ?
  - (b) Solve for  $x$  if  $f(x) = 0$ .
  - (c) Find  $f(1 - x)$ .
  - (d) Find the inverse of  $f(x)$ ,  $f^{-1}(x)$ .
2. For the function  $g(x) = x^2 - 4$  with  $x > 0$ 
  - (a) Simplify the expression  $g(x - 3)$
  - (b) Find  $g^{-1}(x)$ .
3. For the functions  $f(x) = 2 - x^2$  and  $g(x) = 2x - 5$ 
  - (a) What is the value of  $g(3)$ ?
  - (b) Find  $(f \circ g)(3)$ .
  - (c) Find  $(f \circ g)(x)$ .
4. Find the inverse of  $f(x) = \frac{4x - 2}{5}$
5. Given that  $g(x) = \frac{1}{2}x + 2$ 
  - (a) Find the inverse of  $g(x)$ .
  - (b) Graph the function  $g(x)$  and its inverse on the same axes, using the scale 1 unit equals 1 cm and labeling following IB conventions.
6. For the functions defined by  $f(x) = 2x$  and  $g(x) = x + 4$ 
  - (a) Find an expression for  $(f \circ g)(x)$ .
  - (b) Find an expression for  $(g \circ f)(x)$ .
  - (c) Solve  $(f \circ g)(x) = (g \circ f)(x)$ .
7. Write down the domain and range of  $f(x) = x^2 - 6$
8. Using a GDC to analyze the function  $f(x) = \frac{3x + 2}{x + 1}$ 
  - (a) Write down the equations for the asymptotes.
  - (b) Write down the domain and range of  $f(x)$ .

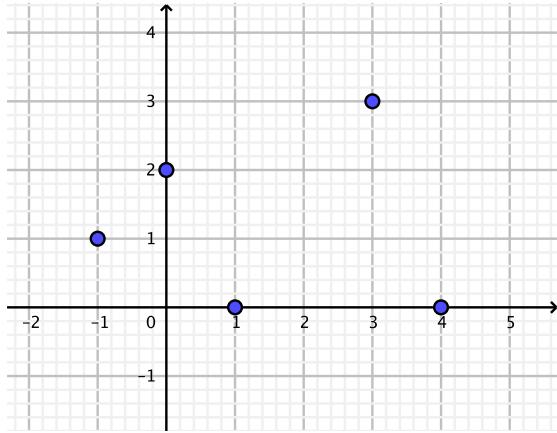


Figure 1: Write down domain and range.

9. Write down the domain and range of the function graphed in Figure 1.
10. For the function shown in Figure 2
  - (a) Write down the equations for the asymptotes.
  - (b) Write down the domain and range of the function.

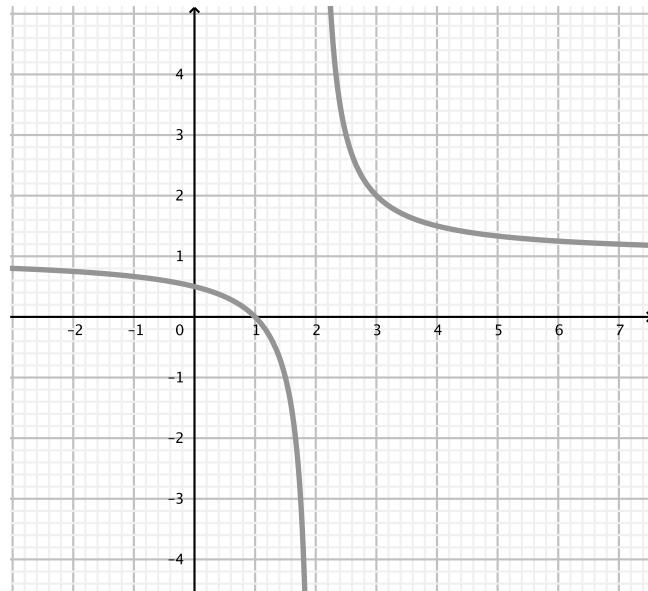


Figure 2: Determine asymptotes.

Graph accurately in pencil using a straight edge or smooth curve.

11. Given the graph of the function  $f(x)$  shown in Figure 3

- (a) Label points on the function representing  $f(-1) = -2$  and  $f(4) = -1$
- (b) Graph the inverse of  $f(x)$  on the same axes. Label the inverses of the points named in part (a)
- (c) Write down the domain and range of  $f(x)$ .

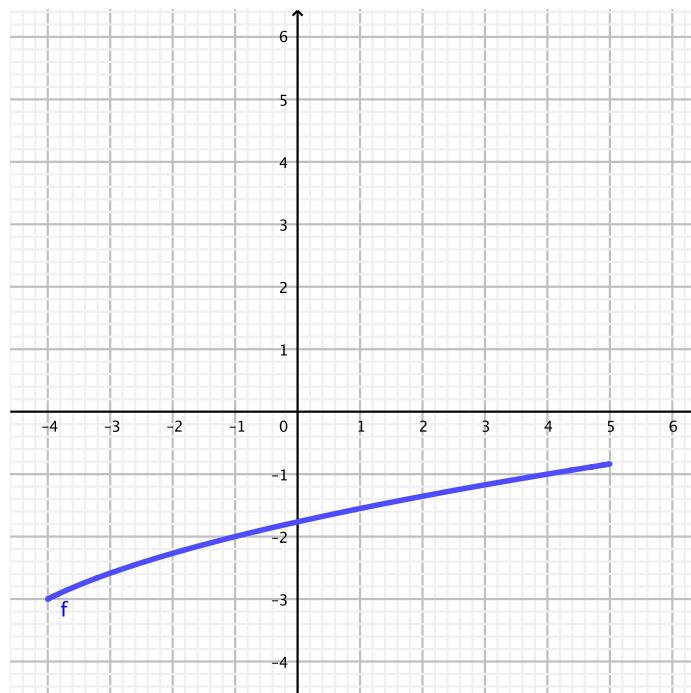


Figure 3: Label given points and plot inverse.

2. [Maximum mark: 5]

Two functions,  $f$  and  $g$ , are defined in the following table.

$x$	-2	1	3	6
$f(x)$	6	3	1	-2
$g(x)$	-7	-2	5	9

- (a) Write down the value of  $f(1)$ . [1]

(b) Find the value of  $(g \circ f)(1)$ . [2]

(c) Find the value of  $g^{-1}(-2)$ . [2]

