

## Section 1: Functions

### Exercise

1. For each of the functions below, sketch the graph of  $y = f(x)$ , and state the range of the function.

(i)  $f(x) = 1 - 3x$  where  $x$  can take any value

(ii)  $f(x) = 1 - 3x$  where  $x > 0$

(iii)  $f(x) = x^2$  where  $x$  can take any value

(iv)  $f(x) = x^2 + 1$  where  $x$  can take any value

(v)  $f(x) = x^2 + 1$  where  $x > 1$

2. The function is defined as:

$$f(x) = \frac{1}{x-1}.$$

(i) What value of  $x$  must be excluded from the domain of this function?

(ii) Find (a)  $f(2)$  (b)  $f(-3)$  (c)  $f(0)$

For what value of  $x$  is  $f(x) = 2$ ?

3. Let  $f(x) = x + 1$ ,  $g(x) = x^3$  and  $h(x) = \frac{1}{x}$ . Find formulae for the following functions

(i)  $f \circ g$

(ii)  $g \circ f$

(iii)  $f \circ h$

(iv)  $g \circ h$

4. Find the inverse function to each of the following functions

(i)  $f(x) = 4x + 2$ , where  $x$  can take any value

(ii)  $f(x) = \frac{x+7}{3}$ , where  $x$  can take any value

5. Show that the function  $f(x) = (x - 3)^4$ , where  $x$  can take any value, is not one to one. Give a domain for  $f$  such that  $f$  has an inverse function.