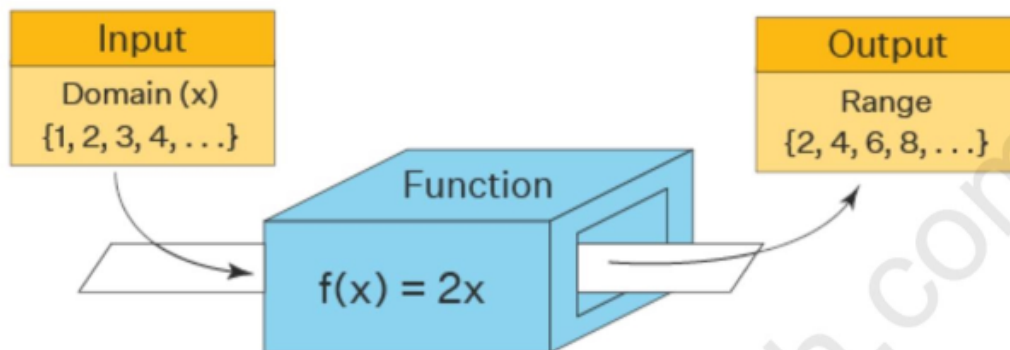


A **domain** of a function refers to all the allowed values that can go into a function (without resulting in undefined values.)

The **range** of a function is the set of all its corresponding outputs.

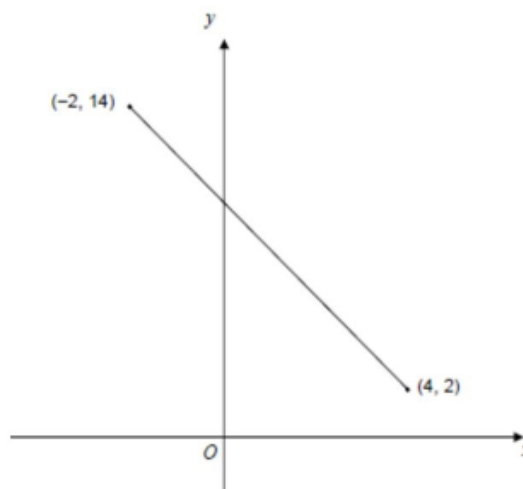


1.  $f(x) = 3x - 5$   
The domain of  $f(x)$  is  $\{-3, 0, 2\}$ .  
Find the range of  $f(x)$ . [2]  
**0580/04/SP/25 Q4)**

2.  $h(x) = 2^{x-3}$   
The domain of  $h(x)$  is  $\{0, 1, 2\}$ .  
Find the range of  $h(x)$

3.  $g(x) = x + 1$  for  $1 \leq x \leq 5$   
Find the range of  $f(x)$ .

4. The straight line shows a sketch of  $y = f(x)$  for the full domain of the function.  
For  $f(x)$  state the  
(a) domain.  
(b) range





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Domain of a Radical Function  $f(x) = \sqrt{ax+b}$ ,  $ax+b \geq 0$ , so  $x \geq -\frac{b}{a}$

Domain of Rational Function  $g(x) = \frac{ax+b}{cx+d}$ , all  $x$  but  $cx+d \neq 0$  so  $x \neq -\frac{d}{c}$

5. Find the domain of the following functions

(a)  $f(x) = \sqrt{x+3}$

(b)  $g(x) = (2x+1)/(x-2)$

(c)  $h(x) = \sqrt{-3x+2}$

(d)  $i(x) = \frac{4x}{3x+1}$

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Range of a Radical Function  $f(x) = \sqrt{ax+b}$ ,  $y \geq 0$

Range of Rational Function  $g(x) = \frac{ax+b}{cx+d}$ , made  $x$  the subject,

$y = \frac{ax+b}{cx+d}$ ,  $x = \frac{b-dy}{cy-a}$ ,  $cy-a \neq 0$  so  $y \neq \frac{a}{c}$  Range : all  $y$  except  $y \neq \frac{a}{c}$

6. By sketching graph or otherwise determine the range of the following functions

(a)  $f(x) = (x-4)^2$  for all values of  $x$

(b)  $f(x) = 2(x-3)^2 - 5$  for all values of  $x$

(c)  $g(x) = 2^x$  for all values of  $x$

(d)  $h(x) = \sin(x)$  for all values of  $x$

(e)  $i(x) = \sqrt{2x+1}$

(f)  $j(x) = \frac{2-x}{x+5}$



7. Find the domain and range of  $f(x) = \sqrt{(x-1)}$

8. For the given function  $g(x) = \frac{1}{2+x}$  find ,

(i) the domain

(ii)  $g^{-1}(x)$

(iii) the range

9. For the given function  $h(x) = \frac{x+1}{3-x}$

(i) the domain

(ii)  $h^{-1}(x)$

(iii) the range

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10. For the given function  $i(x) = \frac{3x}{2x+1}$

- (i) the domain
- (ii)  $i^{-1}(x)$
- (iii) the range

11. Two functions are given by

$$f(x) = 10 - x \quad g(x) = \frac{1}{2x-1}$$

- (a) If the domain of function  $f$  is  $2 < x \leq 4$ , find the range.
- (b) Write down the value of  $x$  that must be excluded from the domain of function  $g$ .

12. This question is about the functions

$$f(x) = x^2, \quad g(x) = \frac{3}{2x-1} \quad \text{and} \quad h(x) = \sqrt{x-3}.$$

- (a) State the range of  $f(x)$ .
- (b) What value of  $x$  must be excluded from the domain of  $g(x)$ ?
- (c) What values of  $x$  must be excluded from the domain of  $h(x)$ ?



13. Work out the range for each of these functions.

(a)  $f(x) = x^2 + 6$  for all  $x$

(b)  $f(x) = 3x - 5$ ,  $-2 \leq x < 6$

(c)  $f(x) = 3x^2$ ,  $x < -2$

14.  $f(x) = 2x^2 + 7$  for all values of  $x$ .

(a) What is the value of  $f(-1)$ ?

(b) What is the range of  $f(x)$ ?

15. By completing the square, determine the range of the following functions:

(a)  $f(x) = x^2 - 2x + 5$ , for all  $x$

(b)  $f(x) = x^2 + 6x - 2$ , for all  $x$

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## Answers

1) $-14, -5, 1$
2) $1/8, 1/4, 1/2$
3) $2 \leq y \leq 6$
4) a) $-2 \leq x \leq 4$ (b) $2 \leq y \leq 14$
5) (a) $x \geq -3$ (b) $x: x \neq 2$ (c) $x \leq \frac{2}{3}$ (d) $x: x \neq -\frac{1}{3}$
6) (a) $y \geq 0$ (b) $y \geq -5$ (c) $y > 0$ (d) $-1 \leq y \leq 1$ (e) $y \geq 0$ (f) $y: y \neq -1$
7) $x \geq 1$ and $y \geq 0$
8) (i) $x: x \neq -2$ (ii) $g^{-1} = \frac{1}{x} - 2$ (iii) $y: y \neq 0$
9) (i) $x: x \neq 3$ (ii) $h^{-1}(x) = \frac{3x-1}{1+x}$ and (iii) $y: y \neq -1$
10) (i) $x: x \neq -\frac{1}{2}$ (ii) $i^{-1}(x) = \frac{x}{3-2x}$ and (iii) $y: y \neq \frac{3}{2}$
11) (a) the range is $6 \leq f(x) < 8$ (b) $x = \frac{1}{2}$
12) (a) $f(x) \geq 0$ (b) $x = \frac{1}{2}$ (c) $x < 3$
13) (a) $y \geq 6$ (b) $-11 \leq y < 13$ (c) $y > 12$
14) (a) 9 (b) $y \geq 7$
15) (a) $(x-1)^2 + 4, y \geq 4$ (b) $(x+3)^2 - 11, y \geq -11$