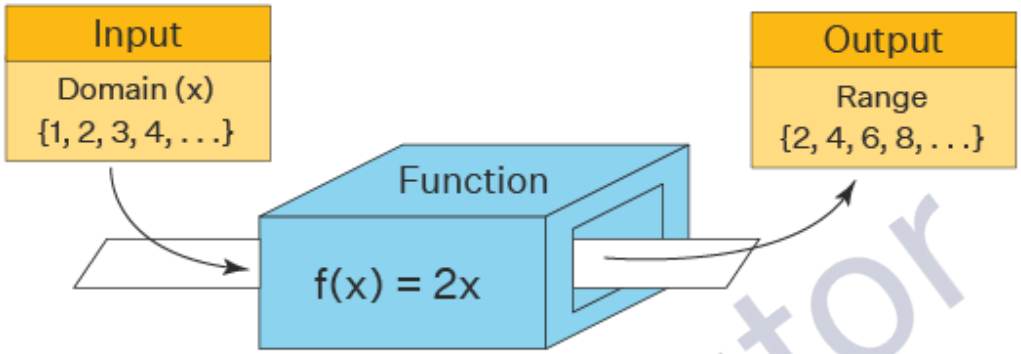


A **domain** of a function refers to all the allowed values that can go into a function (without resulting in undefined values.)

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

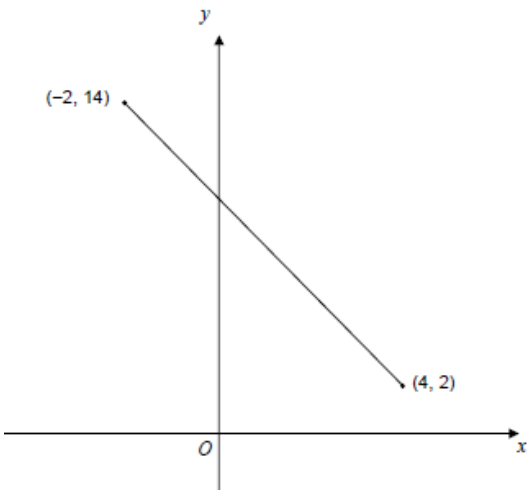



1. $f(x) = 3x - 5$
   The domain of f$(x)$ is $\{-3,0,2\}$.
   Find the range of f$(x)$. [2]
   **0580/04/SP/25 Q4)**

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

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

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 for all values of $x$

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

(e) $i(x) = \sqrt{2x+1}$ for $x \geq -\frac{1}{2}$

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

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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

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

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

(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 $h(x)$ ?

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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 , 1 |
| 3) $2 \leq g(x) \leq 6$ |
| 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) $(x+3)^2 - 11$ , $y \geq -11$ |

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