

Specimen Questions on Function Notation

1. Here are three functions.

$$f(x) = 3 - 2x \qquad g(x) = \frac{1}{x-2} \qquad h(x) = \sqrt{3x+1}$$

- (a) Find (i) $f(-1)$ (ii) $f(\frac{3}{4})$ (iii) $g(4.5)$ (iv) $g(-2)$ (v) $h(5)$ (vi) $h(2\frac{2}{3})$
- (b) (i) Given that $f(x) = -7$, find x .
(ii) Given that $g(x) = 2$, find x .
(iii) Given that $h(x) = 5$, find x .

2. Three functions, p , q and r , are defined as follows.

$$p(x) = x^2 - 3x + 4 \qquad q(x) = \frac{2x-3}{x+1} \qquad r(x) = \sin x^\circ$$

- (a) Find (i) $p(-4)$ (ii) $p(\frac{3}{4})$ (iii) $q(4)$ (iv) $q(-2)$ (v) $r(45)$ (vi) $r(180)$
- (b) (i) Find the values of x for which $p(x) = 2$.
(ii) Find the value of x for which $q(x) = \frac{3}{4}$.
(iii) Find the values of x , in the domain $0 \leq x \leq 180$, for which $r(x) = 0.5$

3. State which values of x cannot be included in the domain of these functions.

(i) $f: x \mapsto \sqrt{5-x}$ (ii) $g: x \mapsto \frac{5}{2x-7}$ (iii) $h: x \mapsto \frac{1}{\sqrt{x+3}}$ (iv) $j: x \mapsto \sqrt{(x^2-4)}$

(v) $l: x \mapsto 2x + \frac{1}{x}$ (vi) $k: x \mapsto \frac{1}{(3x+2)^2}$ (vii) $l: x \mapsto \sqrt{\frac{x-3}{6-x}}$

4. $f: x \mapsto x^3$ $g: x \mapsto \frac{1}{x+8}$

- (a) Find (i) $fg(-4)$, (ii) $gf(5)$.
(b) Find (i) $gf(x)$, (ii) $fg(x)$.
(c) What value(s) must be excluded from the domain of (i) $gf(x)$, (ii) $fg(x)$?
(d) Find and simplify $gg(x)$.

5. Three functions are defined as follows.

$$p(x) = (x+4)^2 \text{ with domain } \{x: x \text{ is any number}\}$$
$$q(x) = 8 - x \text{ with domain } \{x: x > 0\}$$
$$r(x) = \cos x^\circ \text{ with domain } \{x: 0 \leq x \leq 180\}$$

- (a) Find the range of each of these functions.
(b) Find the values of x such that $p(x) = q(x)$.

6. Find the inverse function of each of the following functions.

(a) $f(x) = 2x - 3$ (b) $g(x) = 5 - x$ (c) $h(x) = \frac{1}{3x+4}$ (d) $j(x) = 3 - \frac{2}{x}$

(e) $k(x) = \frac{2x+1}{5-x}$

7. Find the inverse function of each of the following functions.

(a) $p: x \mapsto \sqrt{3x-2}$ (for $x \geq \frac{2}{3}$) (b) $q: x \mapsto \frac{1}{\sqrt{x+2}}$ (for $x > -2$)
(c) $r: x \mapsto x^2 + 5$ (for $x \geq 0$) (d) $s: x \mapsto (x-3)^2$ (for $x \geq 3$)