Functions

Exercise A

1 $f(x) = 2x - 1$ and $g(x) = x^2 + 2x$

Work out

(i) $f(-4)$ **(ii)** $f(0.6)$ **(iii)** $g(3)$ **(iv)** $g(-1)$ **(v)** $f(0)$ **(vi)** $g(0)$.

2 $f(x) = 3x^2$ and $g(x) = \dfrac{6}{x}$

Work out

(i) $f(2)$ **(ii)** $f(-5)$ **(iii)** $g(2)$ **(iv)** $g(-1.5)$ **(v)** $g\left(\dfrac{1}{2}\right)$ **(vi)** $g\left(-\dfrac{2}{3}\right)$.

3 $f(x) = 8 - 3x$ and $g(x) = 4(x + 3)$.

Solve

(i) $f(x) = 0$ **(ii)** $g(x) = 20$ **(iii)** $f(x) = g(x)$.

4 $h(x) = 3x - 2$

Work out expressions, giving answers in the simplest form, for

(i) $h(2x)$ **(ii)** $h(x + 1)$ **(iii)** $h(x^2)$.

5 $f(x) = x^2 + 5x - 1$

Work out expressions, giving answers in the simplest form, for

(i) $f(3x)$ **(ii)** $f(x - 2)$.

6 $g(x) = \dfrac{x + 6}{2x}$

(i) Work out $g(3)$. **(ii)** Solve $g(x) = 3$. **(ii)** Solve $g(2x) = 1$.

Exercise B

1 Work out the range of $f(x)$ in each of the following.

(i)	$f(x) = 3x$	$x < 2$	**(ii)**	$f(x) = x + 4$	$x \geqslant 1$
(iii)	$f(x) = 2x + 4$	$x \geqslant -1$	**(iv)**	$f(x) = 10 - x$	$x \leqslant 4$
(v)	$f(x) = 2x$	$1 \leqslant x \leqslant 5$	**(vi)**	$f(x) = x - 3$	$0 < x < 10$
(vii)	$f(x) = 5 - 2x$	$x \geqslant -3$	**(viii)**	$f(x) = 3 - 4x$	$-2 \leqslant x \leqslant 3$

2 Work out the range of $f(x)$ in each of the following.

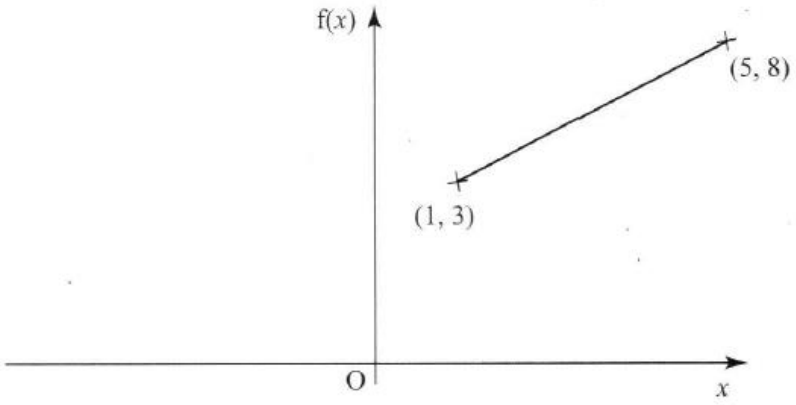
(i) $f(x) = x^2$ $\quad -2 \leqslant x \leqslant 2$ **(ii)** $f(x) = x^2$ $\quad 0 < x < 4$

(iii) $f(x) = x^3$ $\quad x \geqslant 0$ **(iv)** $f(x) = x^3$ $\quad -1 \leqslant x \leqslant 3$

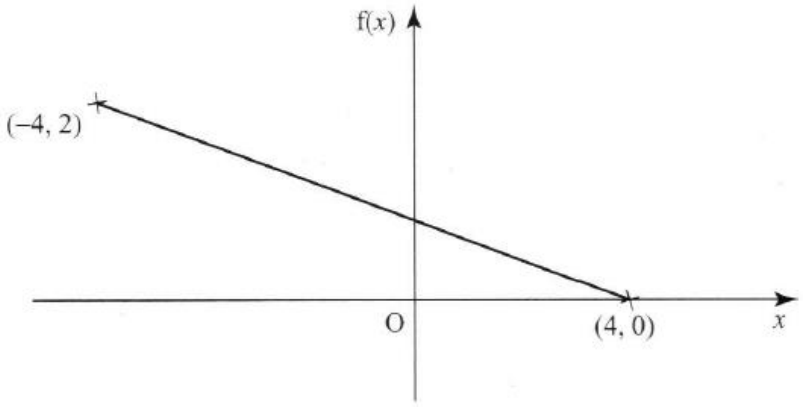
3 In each of the following, a sketch of a function, $f(x)$, is shown.

Write down the domain and the range for $f(x)$.

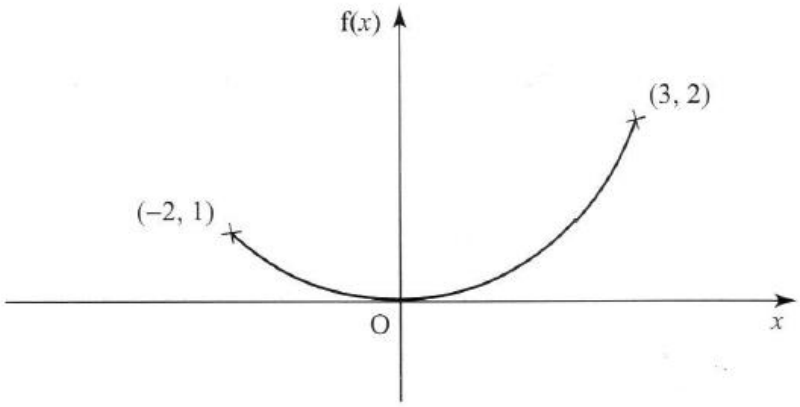
(i)



(ii)



(iii)



Exercise C

1. Given that,

$$f(x) = 2x - 3 \text{ and } g(x) = 4x + 1$$

find the following composite functions.

(a) $fg(x)$

(b) $gf(x)$

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2. Given that,

$$f(x) = 3x + 1,\ g(x) = 2x^2 - 4x + 1 \text{ and } h(x) = \frac{2}{3x}$$

find the following composite functions.

(a) $fg(x)$

(b) $gf(x)$

(c) $gh(x)$

(d) $fh(x)$

(e) $hf(x)$

(f) $hg(x)$

(g) $f^2(x)$

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

find the following.

(a) $fg(2)$

(b) $gh(-2)$

(c) $hf(-1)$

(d) $hg(3)$

(e) $gf(5)$

(f) $g^2(-3)$

4. For each of the following functions, find their inverse functions.

(a) $f(x) = 10x + 3$

(b) $g(x) = \dfrac{2x-1}{3}$

(c) $h(x) = \dfrac{3x+2}{x-1}$

(d) $f(x) = \sqrt{5x+4}$