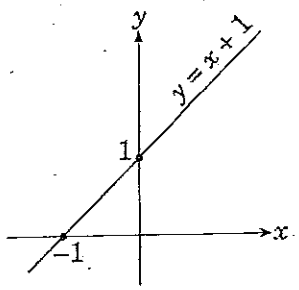
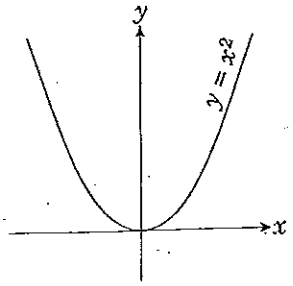
35 Functions and mappings

Question 1 For each graph, state whether it is a function or a non-function:

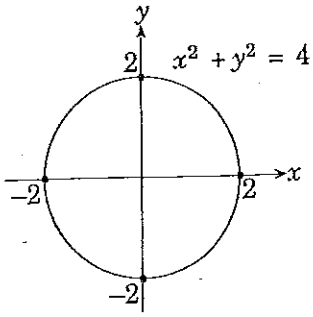
(a)



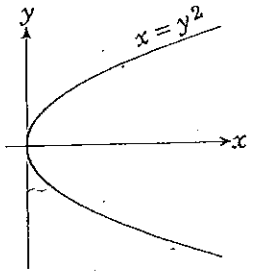
(b)



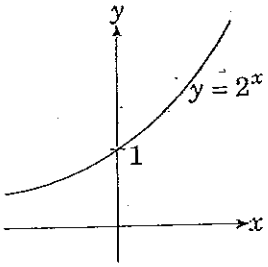
(c)



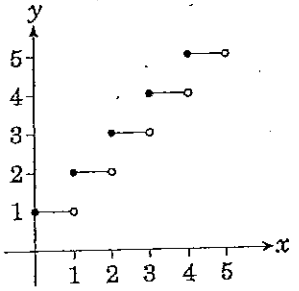
(d)



(e)



(f)



Question 2 If $f(x) = x^2 + 4$, find:

(a) $f(0)$

(b) $f(1)$

(c) $f(2)$

(d) $f(-3)$

Question 3 If $g(x) = \frac{1}{1+x}$, find:

(a) $g(0)$

(b) $g(1)$

(c) $g(a)$

(d) $g\left(\frac{1}{x}\right)$

Question 4 If $F(x) = x + \frac{1}{x}$, show that $F(2) = F\left(\frac{1}{2}\right)$:

Question 5 If $h(x) = 2^{x+1}$, find:

(a) $h(0)$

(b) $h(1)$

(c) $h(a)$

(d) $h(-3)$

Question 6 If $f(x) = 2x^2 - x + 1$, find:

(a) $f(2)$

(b) $f(x+h)$

(c) $f(x+h) - f(x)$

(d) $\dfrac{f(x+h) - f(x)}{h}$

Question 7 $f(x) = x^2 - 1$, $g(x) = 3x - 2$. Find:

(a) $f\big[g(x)\big]$

(b) $g\big[f(x)\big]$

Question 8 $f(x) = 3x + 4$ Find $f^{-1}(x)$ where $f^{-1}(x)$ is the inverse function of $f(x)$.

Question 9 $g(x) = \dfrac{7x+2}{3}$ If $g^{-1}(x)$ is the inverse function of $g(x)$, find:

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

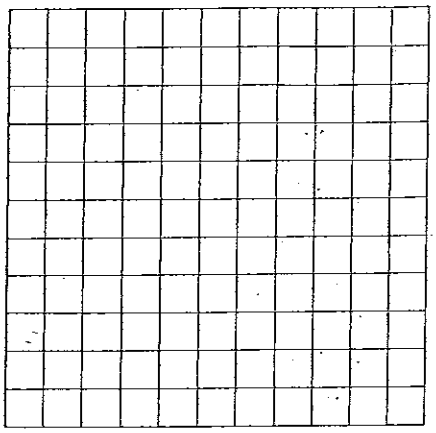
(b) $g^{-1}(0)$

(c) $g^{-1}(2)$

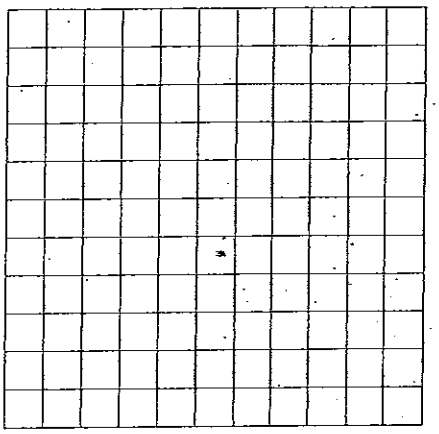
(d) $g^{-1}(-2)$

Question 10 ΔPQR has coordinates $P(1,0)$, $Q(2,3)$, $R(3,1)$. In each case draw ΔPQR and its image using the given mapping.

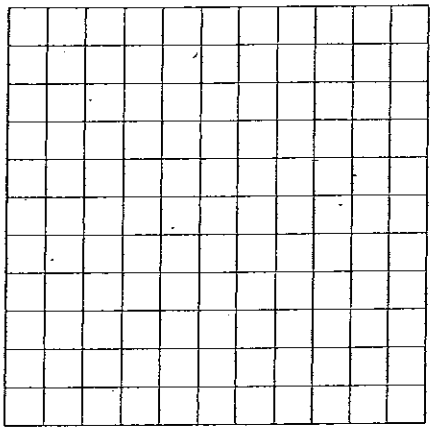
(a) f: $(x, y) \rightarrow (-x, -y)$



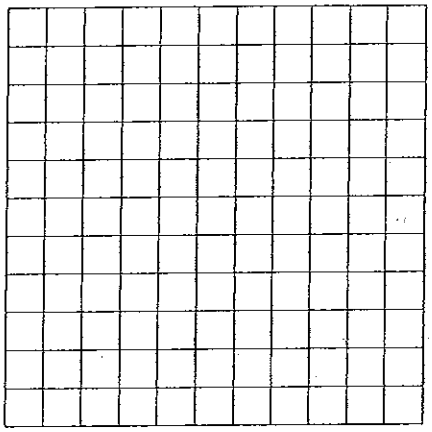
(b) g: $(x, y) \rightarrow (y, x)$



(c) h: $(x, y) \rightarrow (-y, x)$



(d) k: $(x, y) \rightarrow (-y, -x)$



Question 11 If $h: x \rightarrow 2x+1$, $g: x \rightarrow x^2$, find:

(a) $hog(1)$

(b) $goh(1)$

(c) $hog(-2)$

(d) $goh(-2)$

(e) $h^2(-1)$

(f) $g^2(-1)$

35 Functions and mappings – ANSWERS

1 (a) function (b) function (c) non-function
(d) non-function (e) function (f) function

2 (a) 4 (b) 5 (c) 8 (d) 13

3 (a) 1 (b) $\frac{1}{2}$ (c) $\frac{1}{1+a}$ (d) $\frac{x}{x+1}$

4 Proof

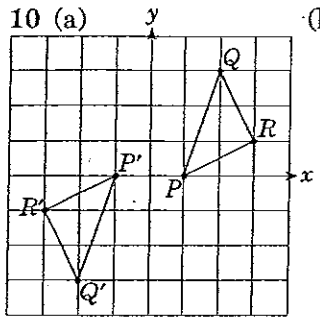
5 (a) 2 (b) 4 (c) 2^{a+1} (d) $\frac{1}{4}$

6 (a) 7 (b) $2x^2+4xh+2h^2-x-h+1$
(c) $2h^2+4xh-h$ (b) $2h+4x-1$

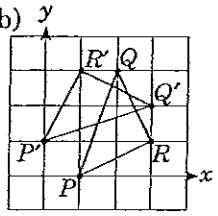
7 (a) $9x^2-12x+3$ (b) $3x^2-5$

8 (a) $\frac{1}{3}x-\frac{4}{3}$ **9** (a) $\frac{3x-2}{7}$
(b) $-\frac{2}{7}$ (c) $\frac{4}{7}$ (d) $-\frac{8}{7}$

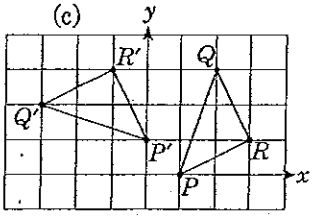
10 (a)



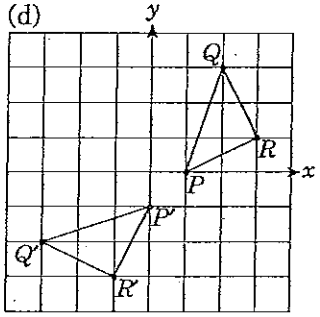
(b)



(c)



(d)



11 (a) 3 (b) 9 (c) 9 (d) 9 (e) −1 (f) 1