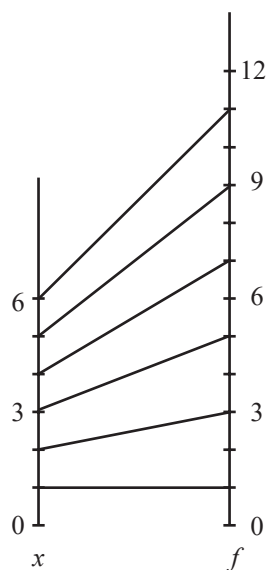


Unit 3 *Functions*

Text Answers

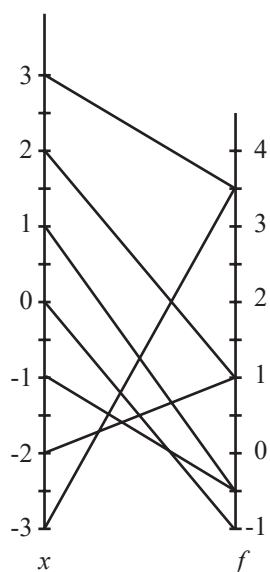
3.1 Functions, Mappings and Domains

1. (a)

(b) $1 \leq f(x) \leq 11$

(c) Yes

2. (a)

(b) $-1 \leq f(x) \leq 3.5$

(c) No

3. (a) (i) $\frac{1}{3}$ (ii) 0 (iii) -1 (iv) 3 (v) 2(b) Function not defined at $x = 1$ (as denominator is zero).

Unit 3 *Functions*

Text Answers

3.1

4. (a) $h(-2) = 3$ (b) $x = \pm 4$
5. (a) (i) $f(-2) = \frac{5}{3}$ (ii) $f(0) = 3$ (iii) $f(2) = -1$ (b) $\frac{1}{3}$
6. (a) $f(2) = 6$ (b) $f(-1) = 3$ (c) $f(0) = 2$
 (d) $f(a^2) = a^4 + 2$ (e) $f(1-a) = (1-a)^2 + 2 = a^2 - 2a + 3$
7. (a) $g(1) = 1$ (b) $g(-1) = -1$ (c) $g(0.01) = 100$
 (d) $g(a^2) = \frac{1}{a^2}$ (e) $g(1-a) = \frac{1}{(1-a)}$
8. (a) (i) -3 (ii) 0 (iii) 1 (iv) 0 (v) -3
 (b) $x = \pm 3$
9. (a) $5^2 - 5 \times 3 = 10$
 (b) $g^2 - 4g + 3 = 0 \Rightarrow g = 1, 3$

3.2 Composite Functions

1. (a) $g(2) = 3$ (b) $f(-2) = -5$ (c) $fg(2) = \frac{5}{6}$ (d) $gf(-2) = -11$
2. (a) (i) $x^3 - 1$ (ii) $(x-1)^3$
 (b) Two solutions; $x = 0$ or $x = 1$
3. (a) $fg(x) = \frac{1}{x+1}$ (b) $gf(x) = \frac{1}{x} + 1$
4. $fg(x) = 1 + \frac{1}{x^2}$, $gf(x) = \left(1 + \frac{1}{x}\right)^2$; $h(1) = 2$, $h(-1) = -2$
5. (a) $fg(x) = x$, $gf(x) = x$
6. $fg(x) = acx + ad + b$
 $gf(x) = acx + cb + d$
 and result follows

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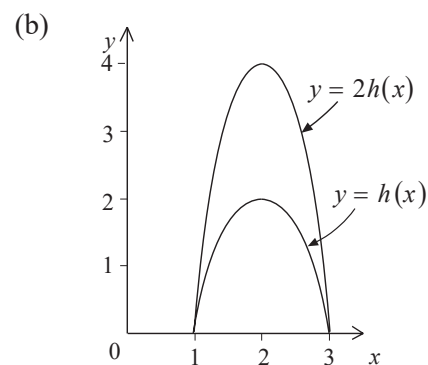
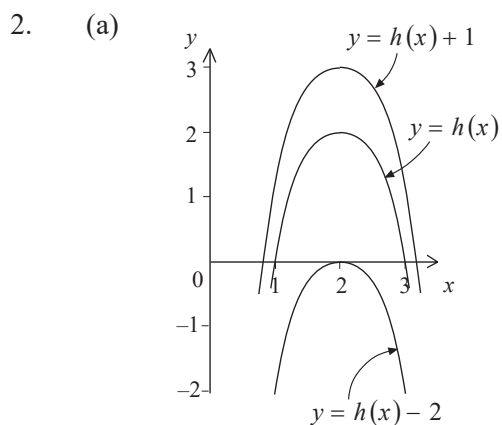
Text Answers

3.3 Inverse Functions

1. (a) $x - 2$ (all x) (b) $\frac{1}{4}(x + 2)$ (all x) (c) x (all x)
 (d) $\frac{3}{x}$ ($x \neq 0$) (e) $\frac{1}{x} - 2$ ($x \neq 0$)
2. $f^{-1}(x) = \frac{3+x}{4}$
3. (a) 18 (b) 2 (c) 7
4. (a) $g(3) = 7$ (b) $fg(2) = \frac{5}{6}$ (c) $f^{-1}(x) = \frac{3x+1}{2-x}$
5. (a) (i) 0 (ii) -3 (iii) $\frac{1}{4}$
 (b) $f^{-1}(x) = \frac{1}{x+4}$; $f^{-1}(4) = \frac{1}{8}$; $f^{-1}(-3) = 1$

3.4 Transformations of Graphs of Functions

1. A : $y = f(x + 2)$
 B : $y = f(x - 3)$
 C : $y = f(x - 5)$

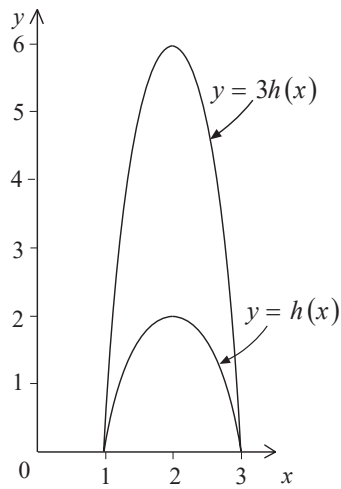


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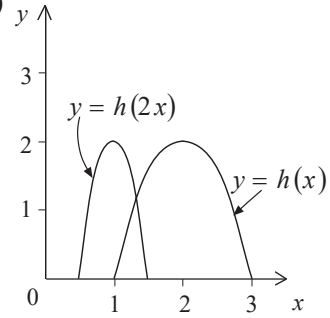
Text Answers

3.4

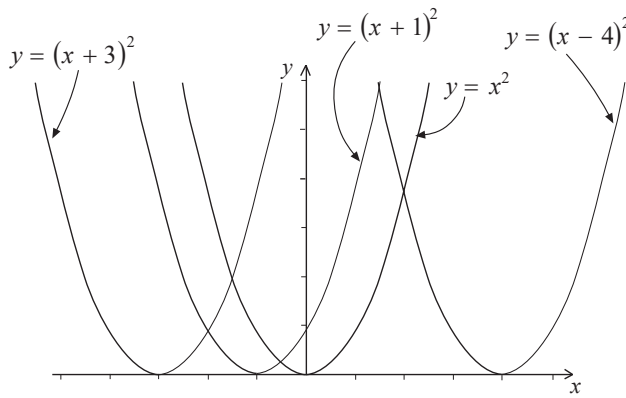
(c)



(d)

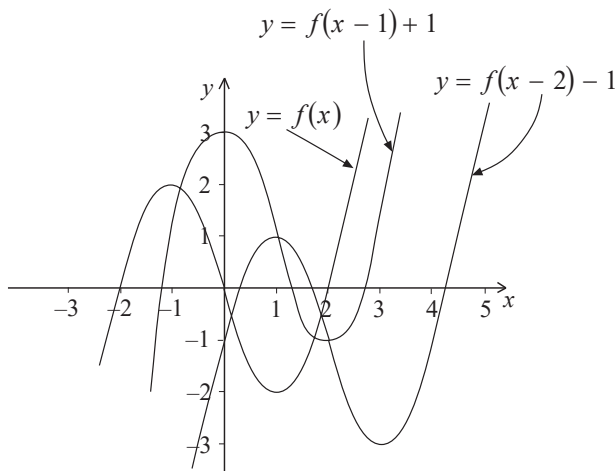


3.



4. (a) Move $y = f(x)$ 2 units along the positive x -axis, and then 2 units up the y -axis.

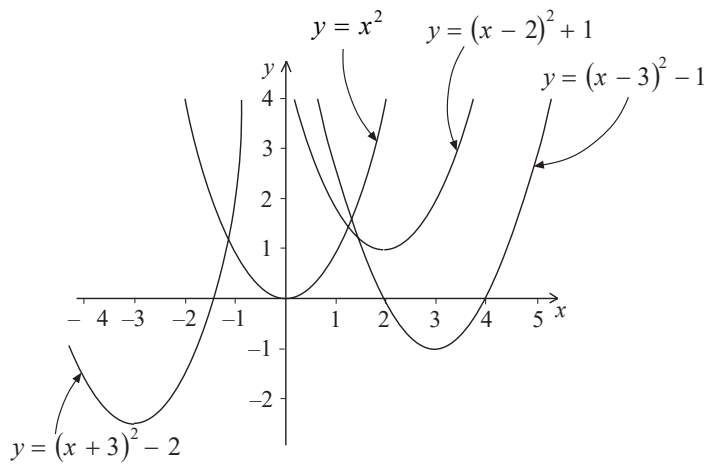
(b)



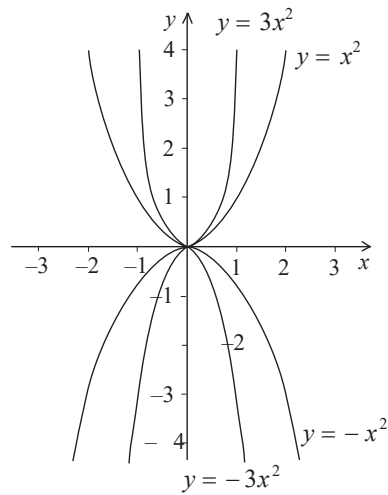
Unit 3 *Functions*

Text Answers

3.4 5.

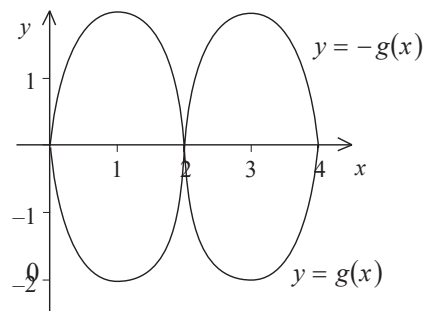


6.

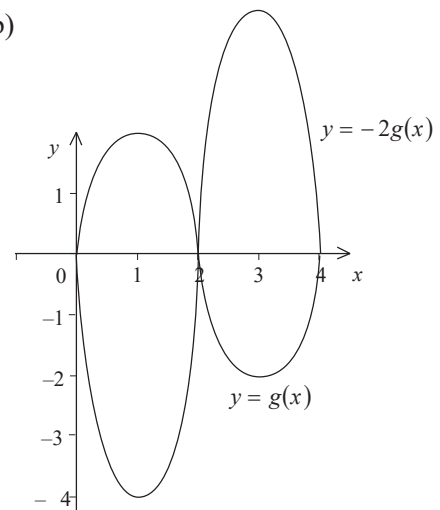


(graphs are reflections of each other)

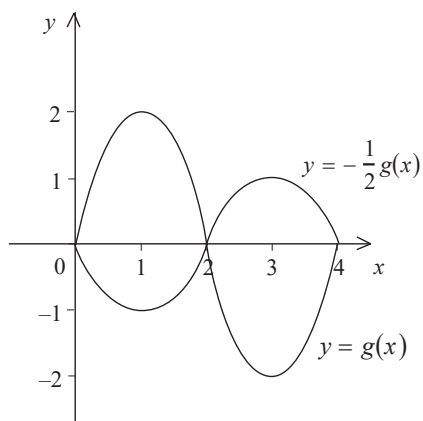
7. (a)



(b)



(c)



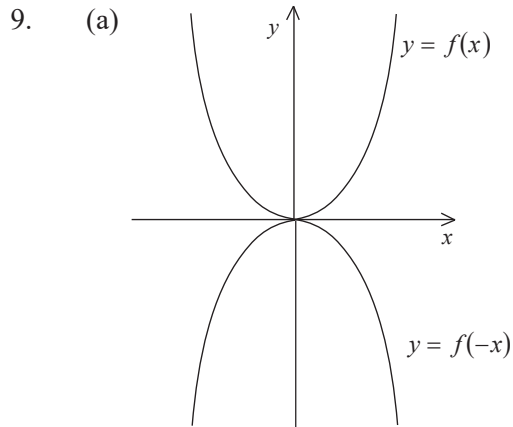
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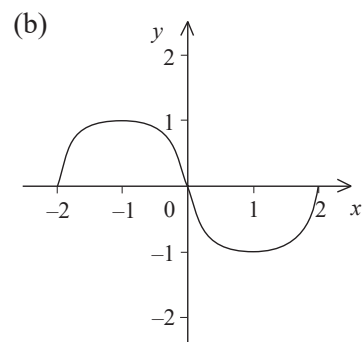
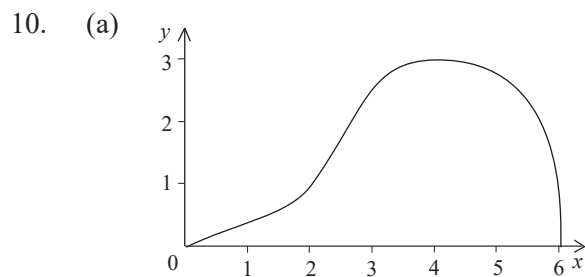
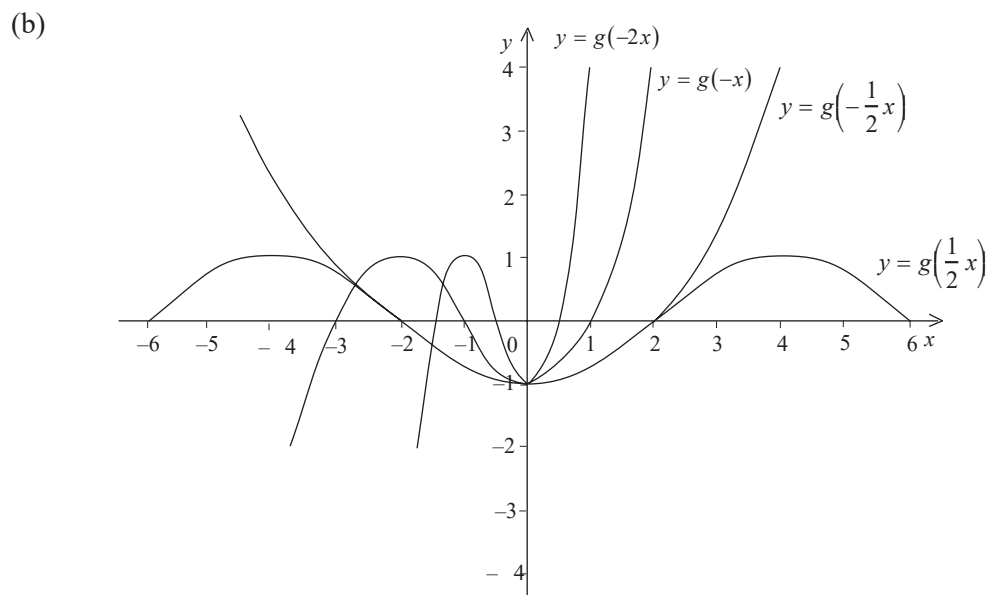
3.4

8. (a) $y = f(x)$ and $y = -f(x)$

(b) $y = f(x - 1)$ and $y = -f(x - 1) + 1$



$y = f(-x)$ is a reflection of $y = f(x)$ in the line $y = 0$ (or x -axis)

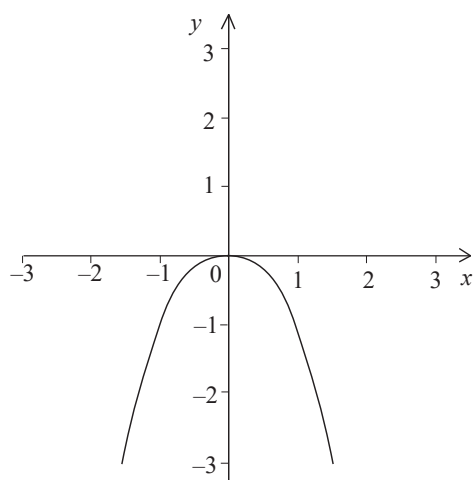


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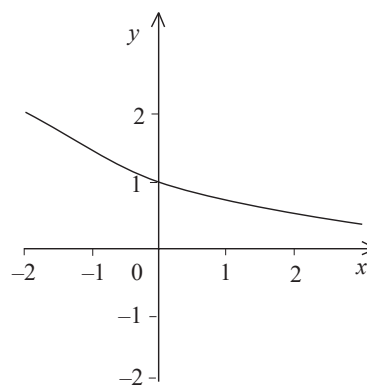
Text Answers

3.4

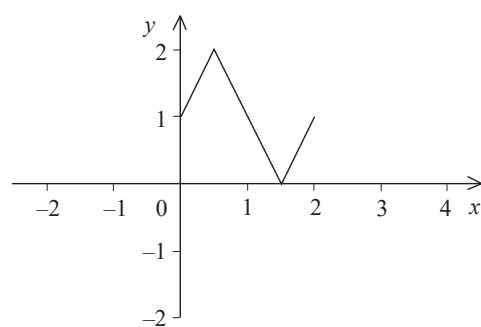
(c)



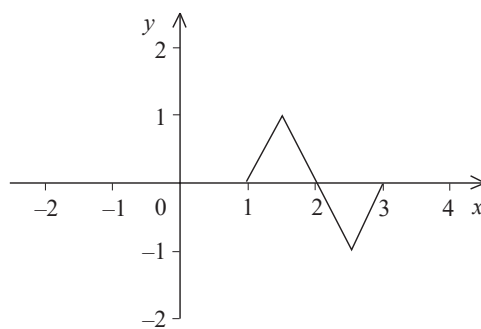
(d)



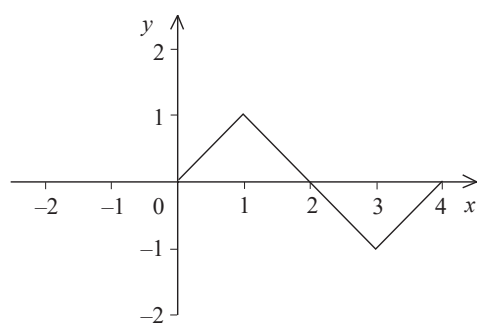
11. (a)



(b)



(c)

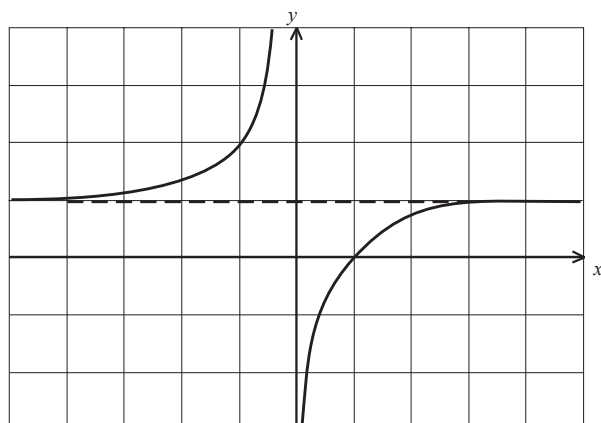


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Text Answers

3.4

12. (a)



(b)

