

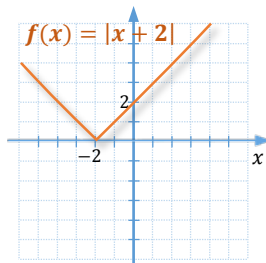
Additional Functions, Conic Sections, and Nonlinear Systems - ANSWERS

C1 Exercises

1. **a.-V**; $y = x^2$; $D = \mathbb{R}$; range = $[0, \infty)$ **b.-III**; $y = x^3$; $D = \mathbb{R}$; range = \mathbb{R}
c.-IV; $y = \sqrt{x}$; $D = [0, \infty)$; range = $[0, \infty)$ **d.-I**; $y = |x|$; $D = [0, \infty)$; range = \mathbb{R}
e.-II; $y = \llbracket x \rrbracket$; $D = \mathbb{R}$; range = \mathbb{Z} **f.-VI**; $y = \frac{1}{x}$; $D = \mathbb{R} \setminus \{0\}$; range = $\mathbb{R} \setminus \{0\}$

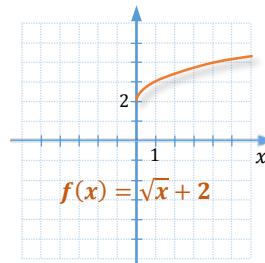
3. Translation: 5 units to the right, 3 units up

5.



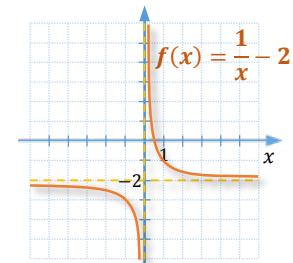
$D = \mathbb{R}$
range = $[0, \infty)$

7.



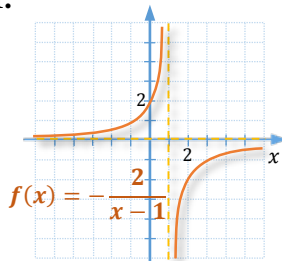
$D = [0, \infty)$
range = $[2, \infty)$

9.



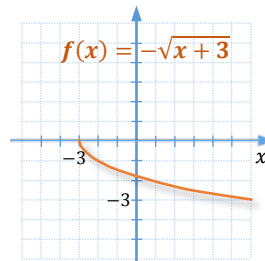
$D = \mathbb{R} \setminus \{0\}$
range = $\mathbb{R} \setminus \{-2\}$
VA: $x = 0$
HA: $y = -2$

11.



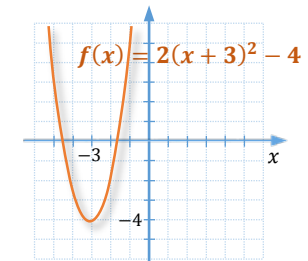
$D = \mathbb{R} \setminus \{0\}$
range = $\mathbb{R} \setminus \{-2\}$
VA: $x = 1$
HA: $y = 0$

13.



$D = [-3, \infty)$
range = $(-\infty, 0]$

15.

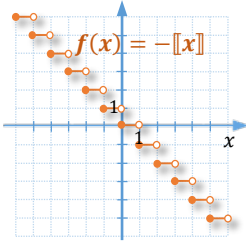


$D = \mathbb{R}$
range = $[-4, \infty)$

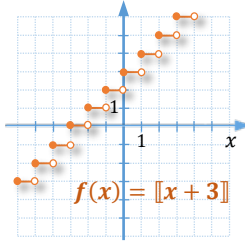
17. 2

19. -2

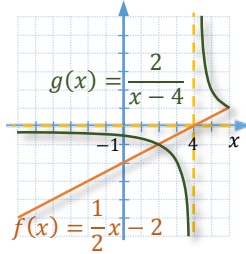
21.



23.

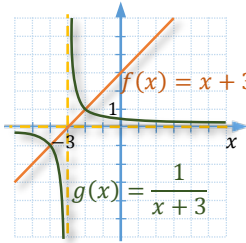


25.



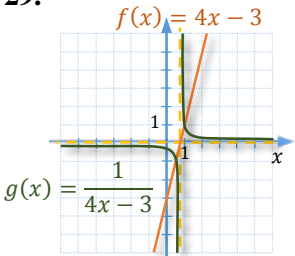
x -int. of f : $(4, 0)$
 VA of g : $x = 4$

27.



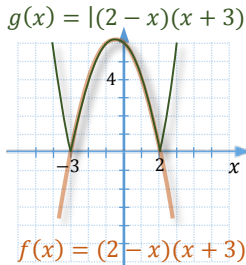
x -int. of f : $(-3, 0)$
 VA of g : $x = -3$

29.



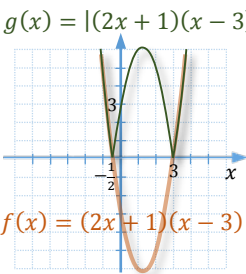
x -int. of f : $(\frac{3}{4}, 0)$
 VA of g : $x = \frac{3}{4}$

31.



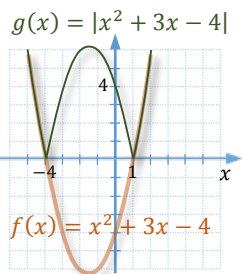
$f(x) = (2 - x)(x + 3)$

33.



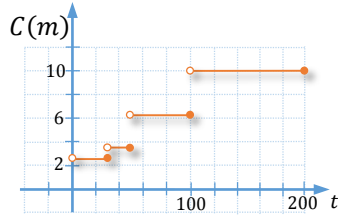
$f(x) = (2x + 1)(x - 3)$

35.



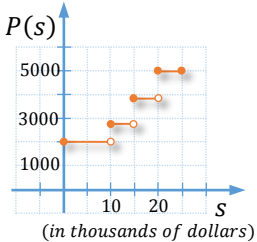
$f(x) = x^2 + 3x - 4$

37.



$$C(t) = \begin{cases} 2.50, & \text{if } 0 < m \leq 30 \\ 3.50, & \text{if } 30 < m \leq 50 \\ 6.25, & \text{if } 50 < m \leq 100 \\ 10, & \text{if } 100 < m \end{cases}$$

39.



$$P(s) = \begin{cases} 2000, & \text{if } 0 \leq s < 10000 \\ 2800, & \text{if } 10000 \leq s < 15000 \\ 3800, & \text{if } 15000 \leq s < 20000 \\ 5000, & \text{if } 20000 \leq s \end{cases}$$

C2 Exercises

1. false

3. false

5. false

7. true

9. $(x - 3)^2 + (y - 1)^2 = 3$

11. $(x + 2)^2 + (y - 2)^2 = \frac{25}{4}$

13. $C(4,5); r = 6$

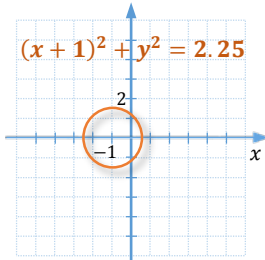
15. $C(6,0); r = 2\sqrt{6}$

17. $C(0,2); r = 2\sqrt{3}$

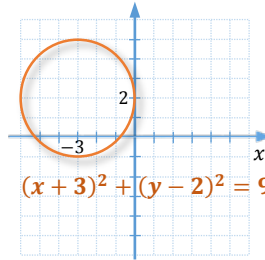
19. $C(-1,0); r = 1.5$

21. $C(-3,2); r = 3$

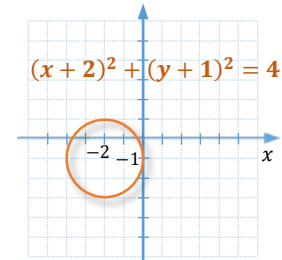
23. $C(-2,-1); r = 2$



$D = \left[-\frac{5}{2}, \frac{1}{2}\right]$
 $\text{range} = \left[-\frac{3}{2}, \frac{3}{2}\right]$



$D = [-6, 0]$
 $\text{range} = [-1, 5]$



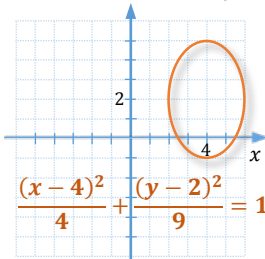
$D = [-4, 0]$
 $\text{range} = [-3, 1]$

25. $(x + 4)^2 + (y + 3)^2 = 1$

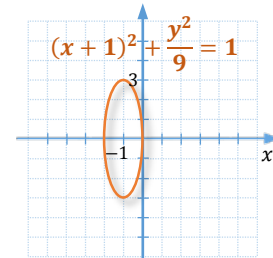
27. $(x - 3r)^2 + y^2 = 16r^2$

29. $C(-1,0); r_x = 1; r_y = 3$

31. $C(4,2); r_x = 2; r_y = 3$



$D = [2, 6]$
 $\text{range} = [-1, 5]$

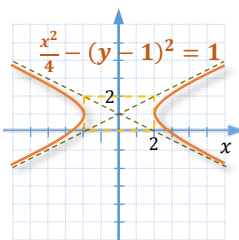


$D = [-2, 0]$
 $\text{range} = [-3, 3]$

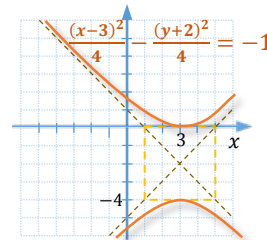
33. $\frac{(x-3)^2}{4} + \frac{(y+2)^2}{9} = 1$

35. $C(0,1); y = 0$

37. $C(3,-2); x = 3$



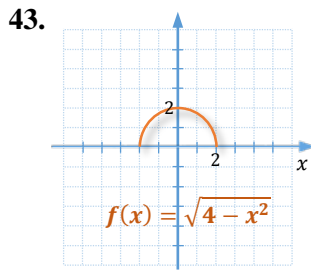
$D = (-\infty, -2] \cup [2, \infty)$
 $\text{range} = \mathbb{R}$



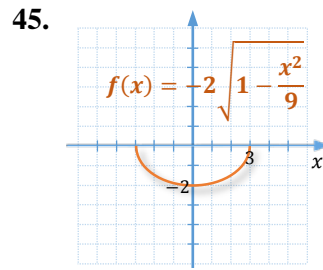
$D = \mathbb{R}$
 $\text{range} = (-\infty, -1] \cup [3, \infty)$

39. $\frac{x^2}{9} - \frac{(y+1)^2}{9} = 1$

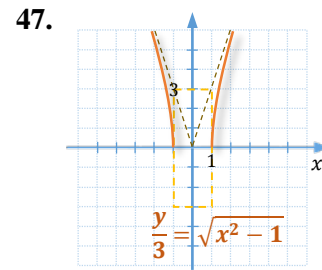
41. $\frac{x^2}{9} - \frac{(y-1)^2}{4} = -1$



$D = [-2, 2]$
range = $[0, 2]$



$D = [-3, 3]$
range = $[-2, 0]$

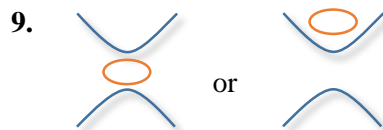
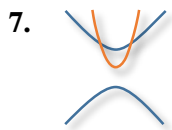
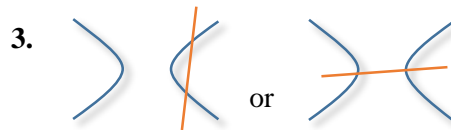


$D = (-\infty, -1] \cup [1, \infty)$
range = $[0, \infty)$

49. 24 m; 5 m

51. 60 m

C3 Exercises



11. a. 2; b. 2; c. 4; d. 0; e. 4

13. $\{(-4, 0), (-3, 1)\}$

15. $\{(-1, 5), (\frac{5}{2}, -2)\}$

17. $\{(-\frac{4}{3}, -\frac{1}{3}), (\frac{4}{3}, \frac{1}{3})\}$

19. $\{(-\sqrt{5}, -2), (\sqrt{5}, -2), (0, 3)\}$

21. $\{(\sqrt{2}, \frac{\sqrt{2}}{2}), (-\sqrt{2}, -\frac{\sqrt{2}}{2})\}$

23. $\{(-\sqrt{3}, 0), (\sqrt{3}, 0)\}$

25. $\{(-\sqrt{5}, -\sqrt{10}), (-\sqrt{5}, \sqrt{10}), (\sqrt{5}, -\sqrt{10}), (\sqrt{5}, \sqrt{10})\}$

27. 8 m by 7.5 m

29. false

31. true

33. true

35. inside; above

37. a.-III; b.-II; c.-IV; d.-I

