

Test #1 Review Exercise Answers

1.

a) $(-\infty, \frac{3}{2})$ or $\{x | x < \frac{3}{2}\}$

b) $[-1, 2) \cup (2, \infty)$ or $\{x | x \geq -1 \text{ and } x \neq 2\}$

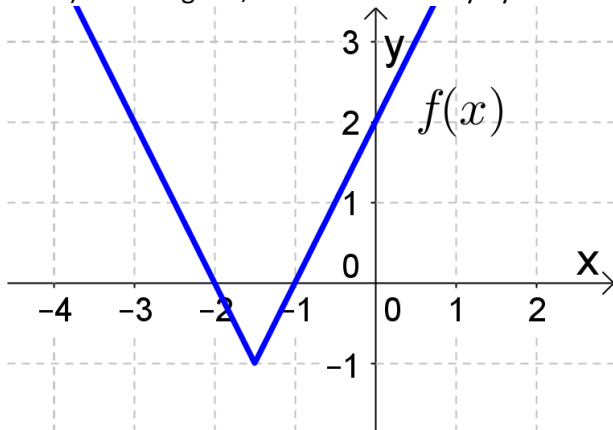
2.

a) $\frac{2}{\sqrt{2x+2h-1} + \sqrt{2x-1}}$

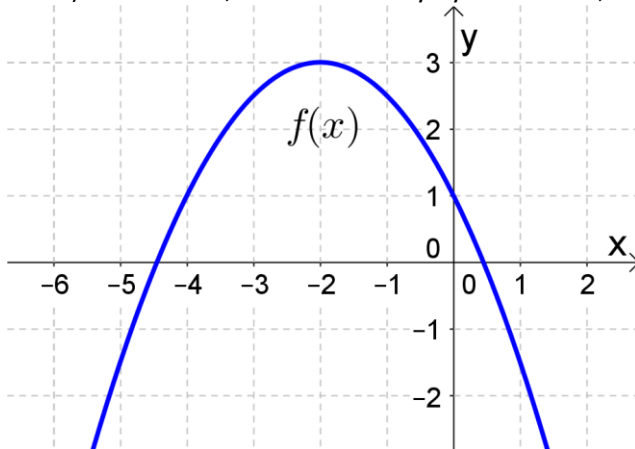
b) $\frac{-1}{(x+h+1)(x+1)}$

3.

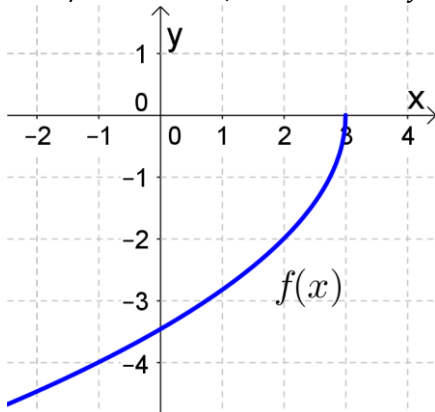
a) Shift right 3, Shrink horizontally by factor of $\frac{1}{2}$, Reflect about y -axis, Shift down 1



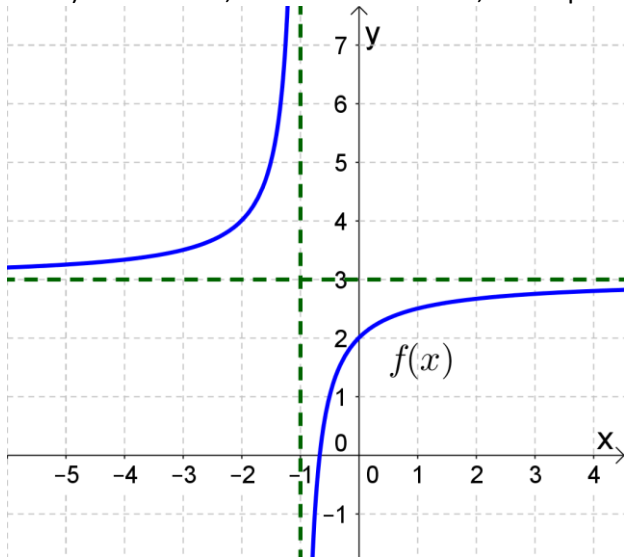
b) Shift left 2, Shrink vertically by factor of $\frac{1}{2}$, Reflect about x -axis, Shift up 3



c) Shift left 3, Reflect about y -axis, Stretch vertically by factor of 2, Reflect about x -axis

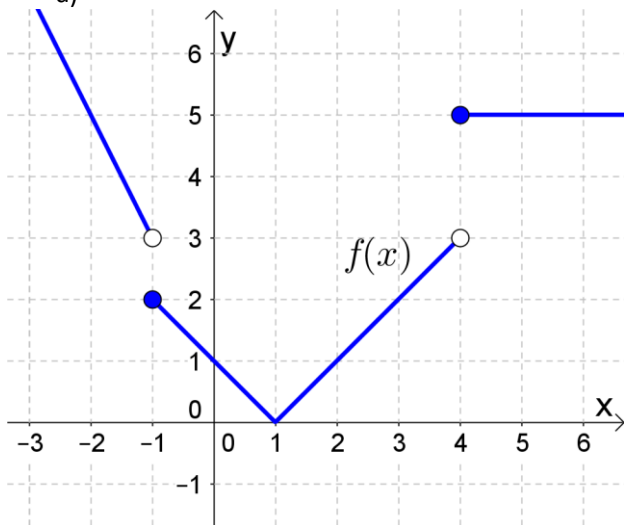


d) Shift left 1, Reflect about x -axis, Shift up 3

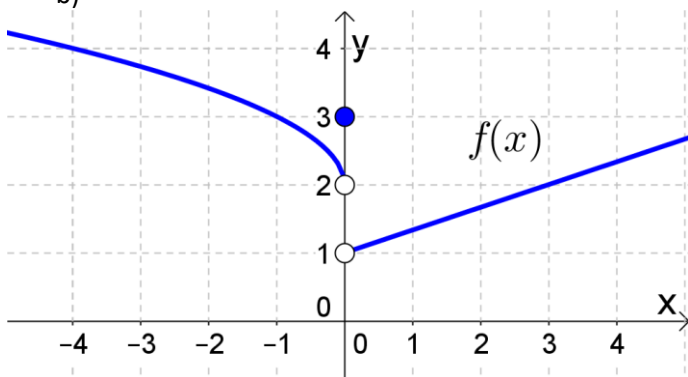


4.

a)



b)



5.

a) $f(-x) = (-x)^4 - |-x| = x^4 - |x| = f(x)$, Even

b) $f(-x) = 3(-x)^5 + (-x)^2 = -3x^5 + x^2 \leftarrow$ This is neither $f(x)$ nor $-f(x)$, Neither

6.

- a) Increasing: $(-\infty, -1], [0, 1]$; Decreasing: $[-1, 0], [1, \infty)$
- b) Local max: $f(-1) = 2, f(1) = 1$; Local min: $f(0) = 0$
- c) Absolute max: $f(-1) = 2$; No absolute min
- d) $(-\infty, \infty)$ or \mathbb{R}
- e) $(-\infty, 2]$

7.

- a) Increasing: $(-3, -1], [2, 4)$; Decreasing: $[-1, 2]$
- b) Local max: $f(-1) = 3$; Local min: $f(2) = 0$
- c) No absolute max; Absolute min: $f(2) = 0$
- d) $(-3, 4)$
- e) $[0, 4)$

8. 1

9. $-\frac{1}{4}$

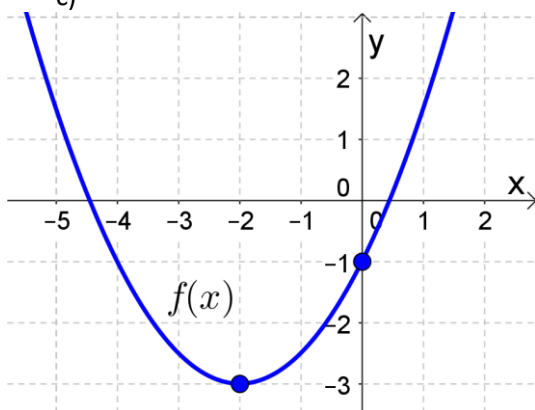
10. Using x as the length of the side along the river, $C(x) = 10x + \frac{4000}{x}$

11. $A(x) = 150x - \frac{9}{2}x^2$

12. $d(x) = \sqrt{x^6 - 2x^4 + 2x^2 + 4x + 4}$

13.

- a) $f(x) = \frac{1}{2}(x + 2)^2 - 3$
- b) $(-2, -3)$
- c)



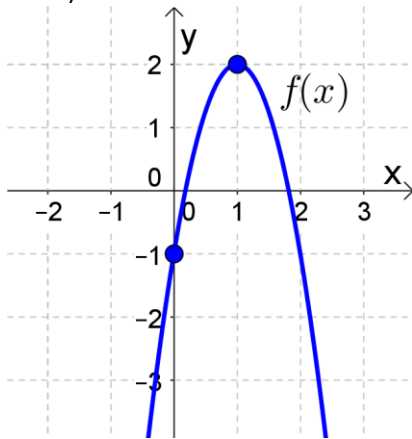
- d) Minimum value: -3
- e) $[-3, \infty)$

14.

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

b) $(1, 2)$

c)



d) Maximum value: 2

e) $(-\infty, 2]$

15. Dimensions: 50 ft by 25 ft; Max area: 1250 ft²

16. A maximum height of 132.5 meters is attained 5 seconds after firing the cannon.

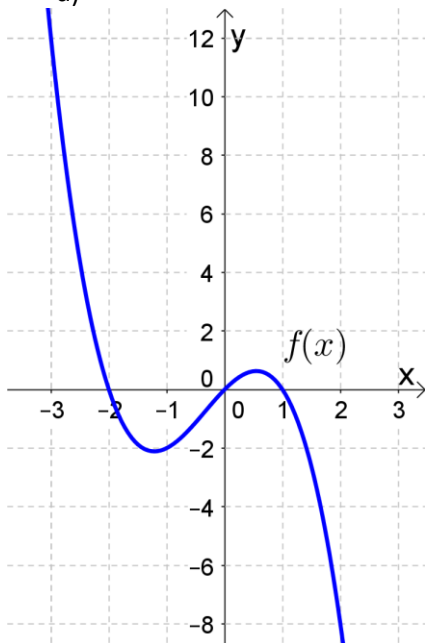
17.

a) x -intercepts: $-2, 0, 1$; y -intercept: 0

b) $(-3, 12), (-1, -2), (\frac{1}{2}, \frac{5}{8}), (2, -8)$

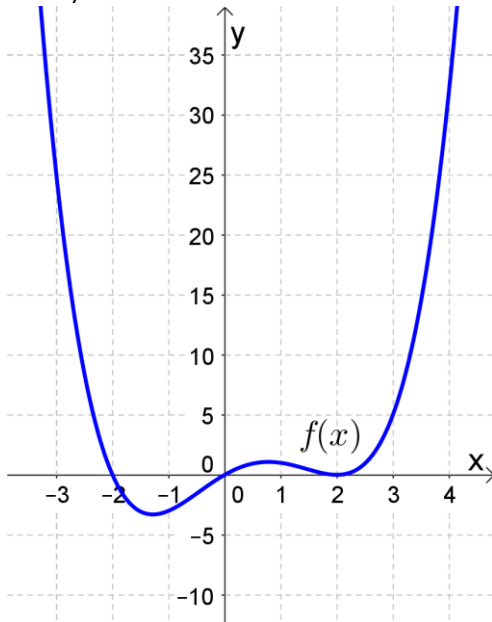
c) As $x \rightarrow \infty, f(x) \rightarrow -\infty$. As $x \rightarrow -\infty, f(x) \rightarrow \infty$.

d)



18.

- a) x -intercepts: $-2, 0, 2$; y -intercept: 0
 b) $(-3, 25), (-1, -3), (1, 1), (3, 5)$
 c) As $x \rightarrow \infty, f(x) \rightarrow \infty$. As $x \rightarrow -\infty, f(x) \rightarrow \infty$.
 d)



19.

- a) -2 (even multiplicity), -1 (odd multiplicity), 2 (even multiplicity)
 b) 4
 c) 5
 d) As $x \rightarrow \infty, f(x) \rightarrow \infty$. As $x \rightarrow -\infty, f(x) \rightarrow -\infty$.

$$20. 2x^2 + 5x + 5 + \frac{10x^2 + 20x + 8}{x^3 - x^2 - 3}$$

$$21. x^3 - 3x + 5 - \frac{4}{2x+1}$$

22. Since $P(2) = 0$, 2 is a zero of $P(x)$. Thus, by the Factor Theorem, $x - 2$ is a factor of $P(x)$. ■

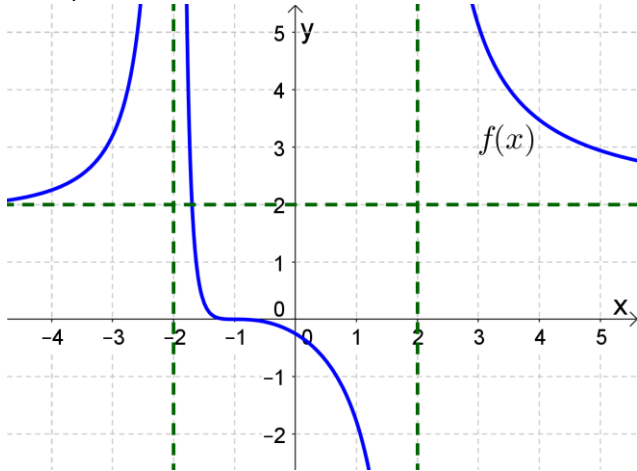
23.

- a) $P(x) = (x + 1)^2(3x - 1)(x + 1 - 2i)(x + 1 + 2i)$; Zeros: -1 (multiplicity 2), $\frac{1}{3}$, $-1 \pm 2i$
 b) $P(x) = (x - 2)(x + 5)(x - 1 - \sqrt{3})(x - 1 + \sqrt{3})$; Zeros: $2, -5, 1 \pm \sqrt{3}$
 c) $P(x) = x(x + 1)(x - 2)^2(x - 2i)(x + 2i)$; Zeros: $0, -1, 2$ (multiplicity 2), $\pm 2i$

$$24. P(x) = x^4 - 2x^3 - 10x^2 + 16x + 40$$

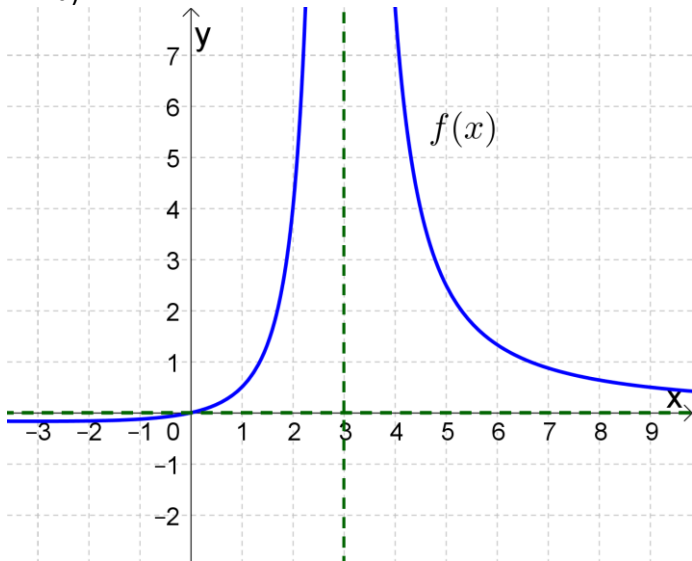
25.

- a) $(-\infty, -2) \cup (-2, 2) \cup (2, \infty)$ or $\{x|x \neq -2 \text{ and } x \neq 2\}$
- b) x -intercept: -1 ; y -intercept: $-\frac{1}{4}$
- c) Vertical asymptotes: $x = -2, x = 2$; Horizontal asymptotes: $y = 2$; Slant asymptotes: none
- d)



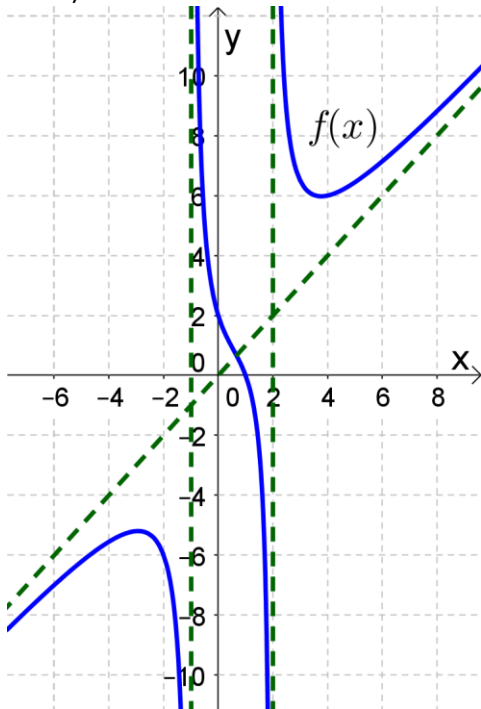
26.

- a) $(-\infty, 3) \cup (3, \infty)$ or $\{x|x \neq 3\}$
- b) x -intercept: 0 ; y -intercept: 0
- c) Vertical asymptote: $x = 3$; Horizontal asymptotes: $y = 0$; Slant asymptotes: none
- d)



27.

- a) $(-\infty, -1) \cup (-1, 2) \cup (2, \infty)$ or $\{x \mid x \neq -1 \text{ and } x \neq 2\}$
 b) x -intercept: 1; y -intercept: 2
 c) Vertical asymptotes: $x = -1, x = 2$; Horizontal asymptotes: none; Slant asymptotes: $y = x$
 d)



28. $f(x) > 0$: $(-\infty, -2) \cup (-1, 0)$; $f(x) \leq 0$: $(-2, -1] \cup (0, 2) \cup (2, \infty)$

29. $(-\frac{1}{2}, 0) \cup (0, 5)$

30. $[-6, -1)$

31. $(-\infty, -1) \cup [2, 3)$

32.

- a) y -axis
 b) origin
 c) secant
 d) $x - c$
 e) $P(c)$
 f) complex zero
 g) n
 h) conjugate