Section 9.2

1. a. Domain: \( \{ x \mid -\infty < x < \infty \} \)
   
   b. Range: \( \{ y \mid -\infty < y < \infty \} \)
   
   c. I and III
   
   d. \( f(x) = x^3, f(x) = x^5 \). \( n \) is odd, the domain and range are the set of real numbers, and the graphs appear in quadrants I and III.

3. a. \( x = 2 \)
   
   b. \( x = -3 \)
   
   c. \( x = -1 \) or \( x = 1 \)

5. a. \( 2x^4 = 50 \)
   
   \( x^4 = 25 \) \quad \text{Divide by 2 on both sides} \n   
   \( x^4 = 5^2 \) \quad \text{Use familiar power} \n   
   \( (x^4)^{1/4} = (5^2)^{1/4} \) \quad \text{Raise to the power 1/4} \n   
   on both sides (even root property) \n   
   \( x = \pm 5^{1/2} \) \quad \text{Use power-of-a-power law: } 2 \cdot \frac{1}{4} = \frac{1}{2} \n   
   \( x = \pm \sqrt{5} \)
   
   b. No real solution; you can't take the even root of a negative number.

7. For each equation use \( Y_1 \) for the left side and \( Y_2 \) for the right side. Adjust the WINDOW so that the point of intersection, if any, appears.

   Windows may vary: \( X_{\text{min}} = 47, X_{\text{max}} = 47, Y_{\text{min}} = 3, Y_{\text{max}} = 3 \)

   a. 
   
   ![Graph of Y1 and Y2 with intersection point]
   
   Solution: \( x = 27.9841 \)

   b. No real solution; the graph of \( Y_1 = X^{(1/4)} \) does not go below the x-axis. Therefore, the graph of \( Y_1 \) does not intersect the graph of \( Y_2 = 2.3 \).

   ![Graph of Y1 and Y2 with no intersection]

   Solution: \( x = 18.89568 \)
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17. \( x = \pm \sqrt{32} = \pm \sqrt{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2} = \pm 2 \cdot 2 \cdot \sqrt{2} = \pm 4 \sqrt{2} \)

19. a. Basic absolute value function
   b. Basic square root function
   c. Basic linear function
   d. Basic reciprocal function
   e. Basic quadratic function
   f. Basic cubic function

21. The graph of \( f(x) \) is shifted up 7 units.

23. 

25. \( x = \frac{-b}{2a} = \frac{-(-4)}{2 \cdot 1} = \frac{4}{2} = 2 \)
   
   \( y = f(2) = 22 - 4 \cdot 2 - 12 = 4 - 8 - 16 = -16 \)
   
   Vertex is \((2, -16)\). Because the coefficient of \( x^2 \)
   is positive, the vertex is the minimum point on the
   graph.

Skills and Review 9.2

9. \[
\sqrt[3]{10x} = 2x \\
\left(\sqrt[3]{10x}\right)^3 = (2x)^3 \\
10x = 4x^3 \\
0 = 4x^3 - 10x \\
0 = 2x(2x^2 - 5) \\
2x = 0 \text{ or } 2x^2 - 5 = 0 \text{ Apply the Zero Product Property}
\]
   
   \[x = 0 \text{ or } x = 2.5\]
   
   Both solutions check.

11. a. \( f(g(x)) = (x - 5) + 5 = x \) and \( g(f(x)) = (x + 5) - 5 = x \)
   
   b. \( f(g(x)) = (x^{1/3})^3 = x \) and \( g(f(x)) = (x^3)^{1/3} = x \)
   
   c. \( f(g(x)) = -(x) = x \) and \( g(f(x)) = -(x) = x \)

13. \((3, 4)\) and \((0, -2)\); Each point \((x, y)\) on the graph of one function has a corresponding point \((y, x)\) on the graph of its inverse function.

15. a. 
   
   b. Yes; the graph of \( Y2 \) appears to be the mirror image of the graph of \( Y1 \), with the line \( y = x \) as the mirror.
   
   c. Yes
   
   d. Yes; when two functions are inverses of each other, each point \((x, y)\) on the graph of one function has a corresponding point \((y, x)\) on the graph of its inverse function.