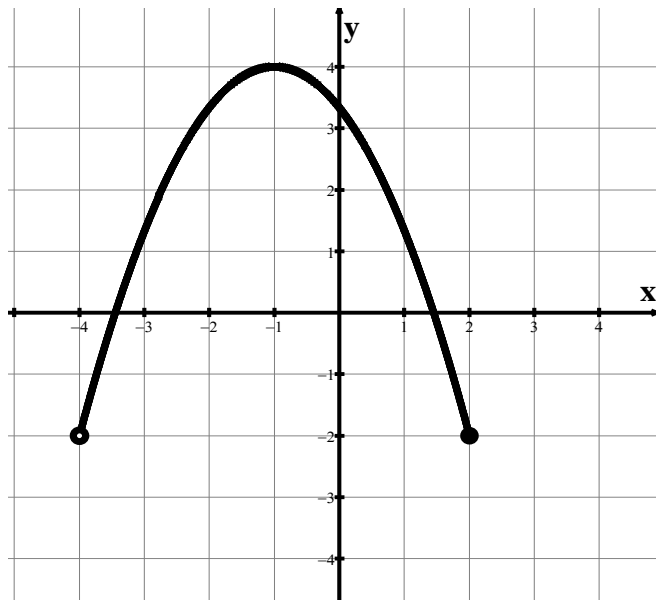


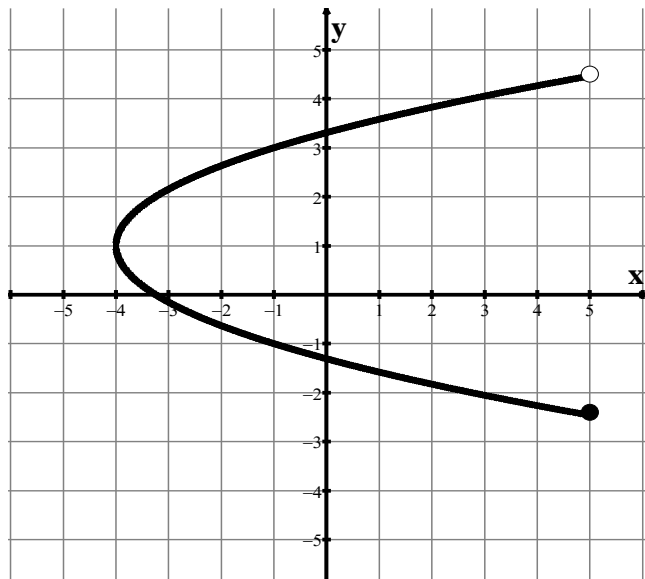
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1. Given the function $f(x) = x^2 - 2x$, find $f(5)$ and $f(-3)$.
2. Given the function $f(x) = \frac{5x+3}{x-6}$, find $f(3)$ and determine the Domain of $f(x)$ and write your answer in Interval Notation and Set-Builder Notation.
3. In which of the following graphs is $f(x)$ a function of x ?

a.



b.

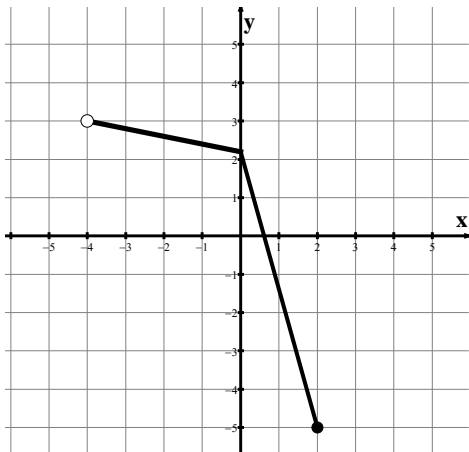


- A. Graph a. only B. Graph b. only C. Both a. and b. D. Neither a. nor b.

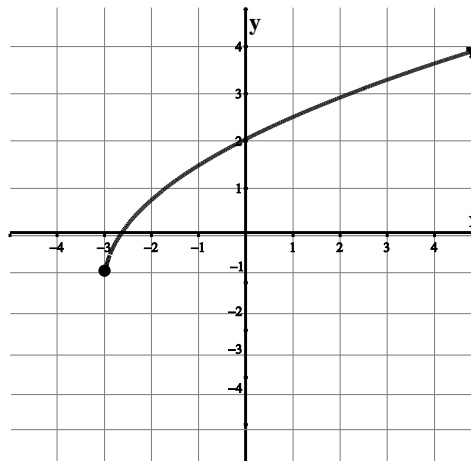
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4. Use the graph to find the Domain and the Range of each function. Write your answer in Interval Notation. Find the function value $f(2)$ for Graph **a**. Find the function value $f(-3)$ for Graph **b**.

a.



b.

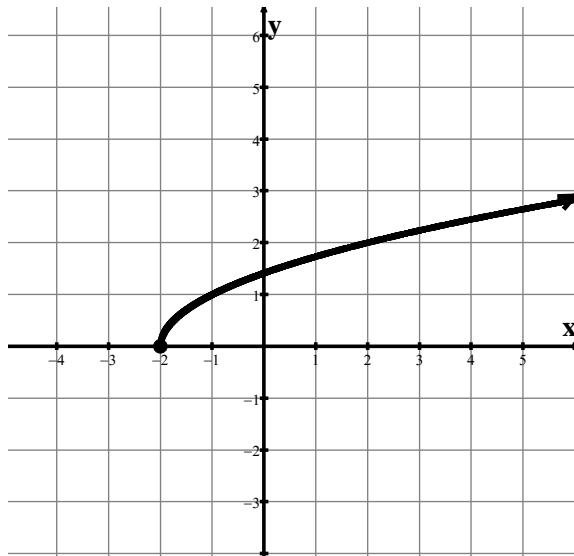


5. Find the Domain of each square root function. Use the Domain of each to determine which function matches the graph below.

a. $f(x) = \sqrt{x+4}$

b. $f(x) = \sqrt{12-3x}$

c. $f(x) = \sqrt{x+2}$



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Simplify problems #6 – 8. Assume all variables represent positive real numbers for #7.

6. $\sqrt[3]{x^{10}}$

7. $\sqrt[4]{a^{12}b^8c^4}$

8. $(125x^6y^{15})^{\frac{1}{3}}$

Assume all variables represent positive real numbers for #9 – 10.

9. Simplify: $\frac{\sqrt[3]{y^2}}{\sqrt[6]{y}}$

10. Multiply and simplify: $\sqrt{18x^3y} \cdot \sqrt{10xy^4}$

11. Simplify: $2\sqrt{8} - 4\sqrt{50} + \sqrt{27}$

A. $3\sqrt{3} + 16\sqrt{2}$

B. $3\sqrt{3} - 16\sqrt{2}$

C. $-2\sqrt{-15}$

D. -13

E. None of these

12. Multiply and simplify: $(\sqrt{3} - 1)(\sqrt{2} + 5)$

A. $\sqrt{6} - 5$

B. $\sqrt{6} + 5\sqrt{3} - \sqrt{2} - 5$

C. $\sqrt{6} + \sqrt{15} - \sqrt{2} - 5$

D. $\sqrt{6} + 4\sqrt{3} - 5$

E. None of these

13. Rationalize the denominator: $\frac{3}{\sqrt{5}-1}$

14. Rationalize the denominator: $\frac{3}{\sqrt[3]{xy^2}}$

15. Solve: $\sqrt{4x+5} - 7 = 0$

16. Solve: $5 = x - \sqrt{x-3}$

A. $x = 7, 4$

B. $x = -7, -4$

C. $x = 7$

D. *No Solution*

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17. Multiply and simplify: $(3 - 2i)(4 + 2i)$

A. $8 - 2i$

B. $16 - 4i$

C. $16 - 2i$

D. $12 - 6i$

E. None of these

18. Divide and simplify to the form $a + bi$: $\frac{6-3i}{4+i}$

19. The maximum number of volts, E , that can be placed across a resistor is given by $E = \sqrt{PR}$, where P is the power in watts and R is resistance in ohms. If a 2 watt resistor can have at most 40 volts of electricity across it, find the number of ohms of resistance of this resistor.

Solve problems #20 – 22 using the method specified.

20. Square Root Principle: $3x^2 = 21$

21. Completing the Square: $x^2 + 2x + 4 = 0$

22. Quadratic Formula: $2x^2 - 1 = 2x$

23. Find the coordinates of the vertex for the parabola defined by the equation:

$$f(x) = 2(x - 3)^2 - 1.$$

A. $(-3, 1)$

B. $(3, -1)$

C. $(-3, -1)$

D. $(3, 1)$

E. None of these

24. Find the coordinates of the vertex for the parabola defined by the equation:

$$f(x) = -3x^2 + 6x - 5.$$

A. $(-6, -5)$

B. $(1, -2)$

C. $(2, -5)$

D. $(-2, 1)$

E. None of these

25. An arrow is shot straight up into the air from the top of a 30 meter high cliff.

The function $h(t) = -5t^2 + 40t + 30$ describes the arrow's height (h) above the ground, in meters, t seconds after it was fired. After how many seconds does the arrow reach its maximum height? What was the maximum height? Approximately, when will the arrow hit the ground, to the nearest tenth of a second?

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Factor completely for problems #26 – 30.

26. $81a^3 - 4a$

27. $15x^3 - 51x^2 + 18x$

28. $6x^2 + 17x + 12$

29. $4x^2 - 7x + 6$

30. $8x^2 - 18xy + 9y^2$

31. Solve: $25x^2 - 36 = 0$

32. Solve: $x^2 - x = 30$

33. Solve the inequality. Graph the answer on a number line, write the answer in Interval Notation, and Set-Builder Notation: $-25x - 90 < -5(4x - 12)$.

34. Solve the absolute value equation: $|3x + 4| + 17 = 8$

35. Solve the absolute value equation: $|2x + 7| = 4$

Solve the absolute value inequality. Graph the answer on a number line, write the answer in Interval Notation, and write the answer in Set-Builder Notation for problems #36 – 37.

36. $|x| + 3 \leq 14$

37. $|x + 13| > 16$

Graph each of the following functions using a graphing utility given the specified window:

38. $f(x) = -2|x - 15| + 25$

$x - \min = -5 ; x - \max = 40 ; y - \min = -15 ; y - \max = 30$

39. $g(x) = 6x^2 - x - 35$

$x - \min = -5 ; x - \max = 5 ; y - \min = -40 ; y - \max = 10$

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Given $f(x) = 5x^3 - 2$ and $g(x) = 4x^2 + 1$, answer questions #40 – 43.

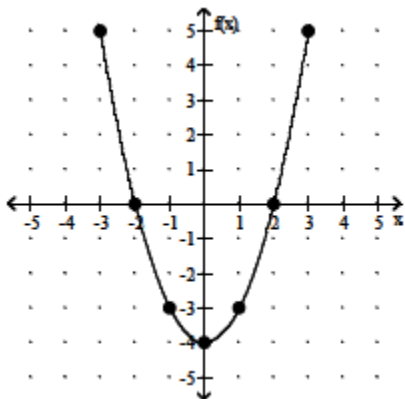
40. $(f + g)(x)$

41. $(f - g)(x)$

42. $(f \cdot g)(x)$

43. $\left(\frac{f}{g}\right)(x)$

44. Use the graph of the function below to find (a) $f(1)$, (b) Find all values of x such that $f(x) = 0$, and (c) Determine the minimum value for graph provided.



45. Business people are concerned with cost functions, revenue functions, and profit functions. Profit is revenue less cost. Break-even is when the revenue is equivalent to the cost. Suppose the revenue function, $R(x)$, is defined by $R(x) = 320x$ and the cost function, $C(x)$, is defined by $C(x) = 2300 + 180x^2$. Find the profit function, $P(x)$.

Simplify problems #46 – 50.

46. $\frac{m^2 - 9m}{9 - m}$

47. $\frac{3x + 3}{15x^2 + 21x + 6}$

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48. $\frac{k^2+10k+25}{k^2+12k+35} \cdot \frac{k^2+7k}{k^2+3k-10}$

49. $\frac{x^2-49}{x^2+12x+36} \div \frac{8x-56}{x^2-4x-60}$

50. $\frac{5x}{x+1} + \frac{6}{x-1} - \frac{10}{x^2-1}$

51. Solve: $\frac{x-1}{x+5} = \frac{x+2}{x-5}$

52. Solve: $\frac{8}{y+5} - \frac{4}{y-5} = \frac{12}{y^2-25}$

53. A boat moves 5 miles upstream in the same amount of time it moves 20 miles downstream. If the rate of the current is 9 mph then find the rate of the boat in still water.

54. Simplify: $\frac{49t^2-64s^2}{\frac{st}{\frac{7}{s}-\frac{8}{t}}}$

55. Solve: $\left(\frac{1}{6}x - 2\right)^2 = 45$

56. Use the Quadratic Formula to solve: $x^2 + 4x + 20 = 0$.

57. A painter can paint a billboard sign in 4 hours. His assistant can paint the same billboard sign in 6 hours. How long will it take them to paint the very same billboard sign if they paint it together?

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ANSWER KEY:

1. $f(5) = 15$ and $f(-3) = 15$
2. $f(3) = -6$. The Domain in Interval Notation is: $(-\infty, 6) \cup (6, \infty)$ and the Domain in Set-Builder Notation is: $\{x|x \text{ is an element of the real number system, } x \neq 6\}$.
3. **A.** Graph **a.** only
4. **a.** Domain: $(-4, 2]$ Range: $[-5, 3)$ $f(2) = -5$
b. Domain: $[-3, \infty)$ Range: $[-1, \infty)$ $f(-3) = -1$
5. **a.** Domain: $[-4, \infty)$ **b.** Domain: $(-\infty, 4]$ **c.** Domain: $[-2, \infty)$
The graph matches function **c.** $f(x) = \sqrt{x+2}$
6. $x^3\sqrt[3]{x}$
7. a^3b^2c
8. $5x^2y^5$
9. \sqrt{y}
10. $6x^2y^2\sqrt{5y}$
11. **B.** $3\sqrt{3} - 16\sqrt{2}$
12. **B.** $\sqrt{6} + 5\sqrt{3} - \sqrt{2} - 5$
13. $\frac{3\sqrt{5}+3}{4}$
14. $\frac{\sqrt[3]{2x^2y}}{xy}$
15. $x = 11$
16. **C.** $x = 7$
17. **C.** $16 - 2i$
18. $\frac{21}{17} - \frac{18}{17}i$
19. 800 ohms of resistance
20. $x = \pm\sqrt{7}$
21. $x = -1 \pm i\sqrt{3}$
22. $x = \frac{1 \pm \sqrt{3}}{2}$
23. **B.** $(3, -1)$
24. **B.** $(1, -2)$
25. The arrow reaches a maximum height of **110 meters** after **4 seconds**. The arrow hits the ground in approximately **8.7 seconds**.

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26. $a(9a + 2)(9a - 2)$

27. $3x(5x - 2)(x - 3)$

28. $(3x + 4)(2x + 3)$

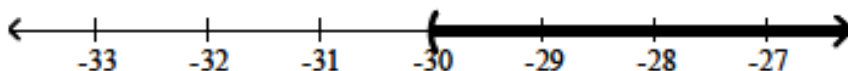
29. Prime

30. $(4x - 3y)(2x - 3y)$

31. $x = \pm \frac{6}{5}$

32. $x = 6, -5$

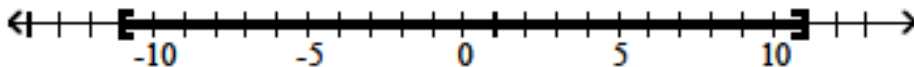
33. $(-30, \infty); \{x|x > -30\};$



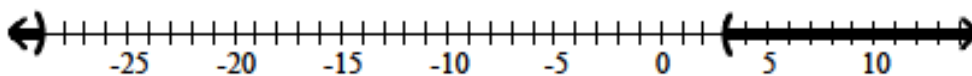
34. \emptyset or No Solution

35. $x = -\frac{3}{2}, -\frac{11}{2}$

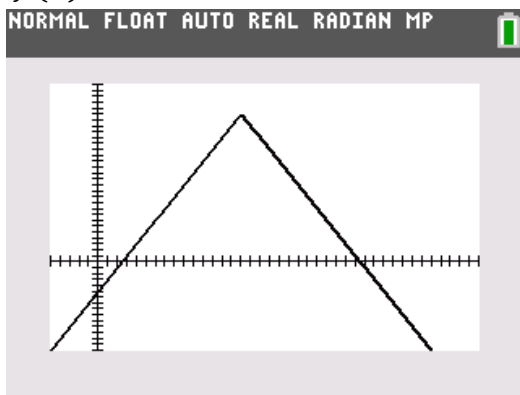
36. $[-11, 11]; \{x|-11 \leq x \leq 11\};$



37. $(-\infty, -29) \cup (3, \infty); \{x|x < -29 \text{ or } x > 3\};$

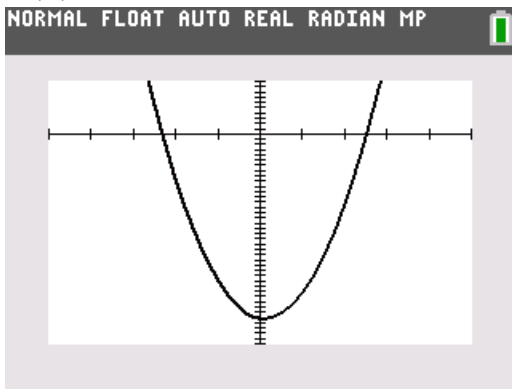


38. $f(x) = -2|x - 15| + 25$



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39. $g(x) = 6x^2 - x - 35$



40. $5x^3 + 4x^2 - 1$

41. $5x^3 - 4x^2 - 3$

42. $20x^5 + 5x^3 - 8x^2 - 2$

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

44. (a) -3 (b) 2 and -2 (c) The minimum value for the graph is -4 , when $x = 0$.

45. $P(x) = -180x^2 + 320x - 2300$

46. $-m$

47. $\frac{1}{5x+2}$

48. $\frac{k}{k-2}$

49. $\frac{(x+7)(x-10)}{8(x+6)}$

50. $\frac{5x-4}{x-1}$

51. $x = -\frac{5}{13}$

52. $y = 18$

53. The boat is traveling 15 mph in still water.

54. $8s + 7t$

55. $x = 12 \pm 18\sqrt{5}$

56. $-2 \pm 4i$

57. The painters can paint the billboard sign in approximately **2.4 hours**, if they work together.