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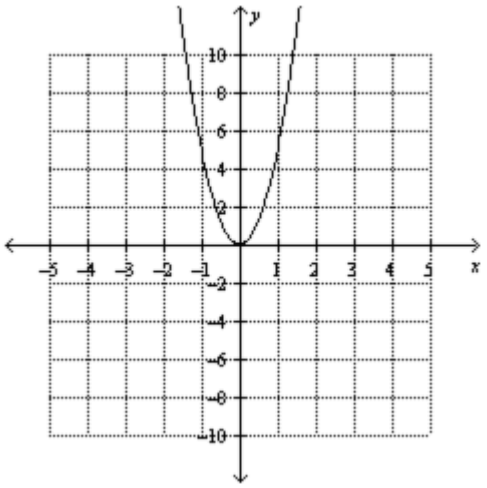
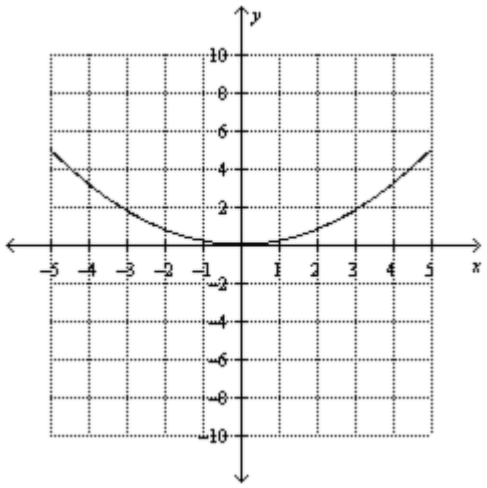
Indicate the answer choice that best completes the statement or answers the question.

1. Graph $g(x) = \frac{1}{5}x^2$.

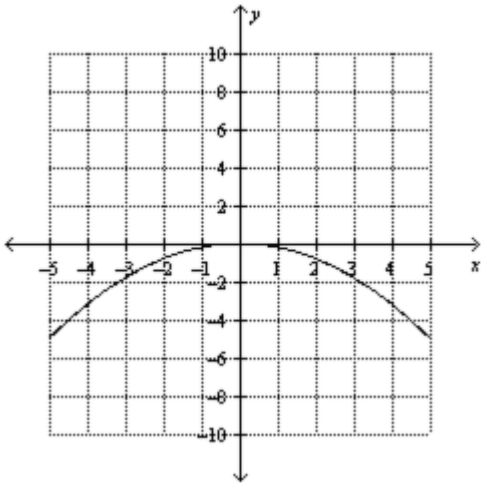
a.



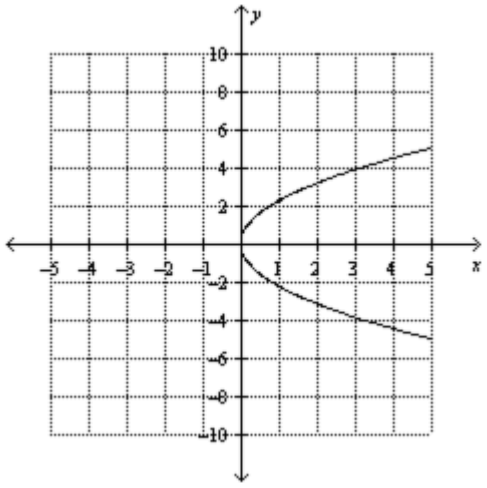
b.



c.



d.



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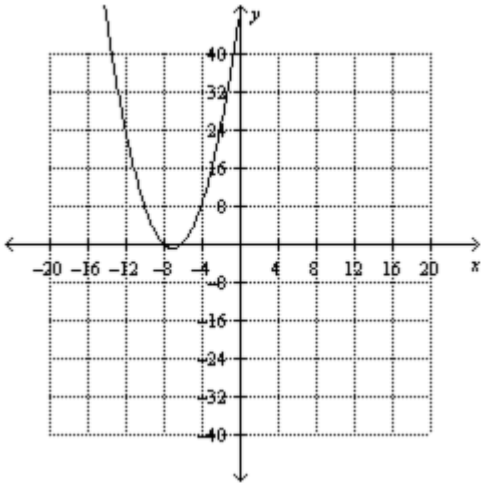
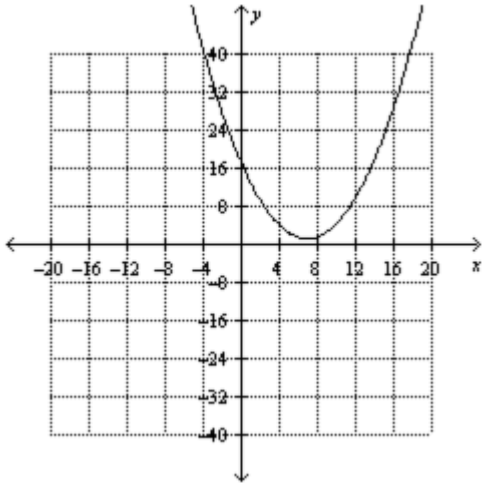
2. Graph $f(x) = \frac{1}{3}(x-7)^2 - 1$.

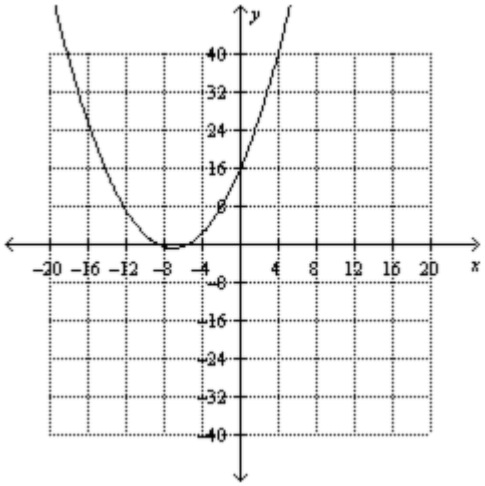
a.



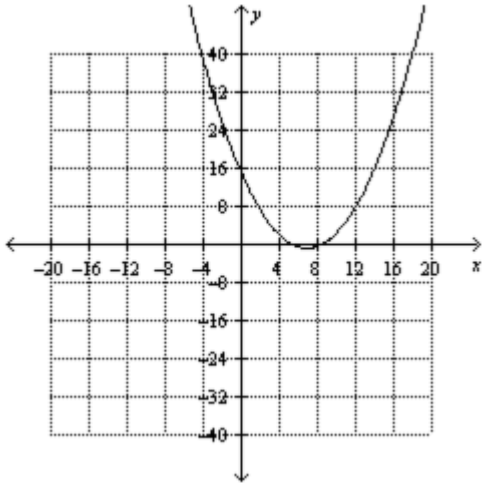
b.



c.



d.



3. Find the amount of time required to double an amount at 5.84% if the interest is compounded continuously.

a. 5.15 years b. 5.94 years
c. 11.87 years d. 23.74 years

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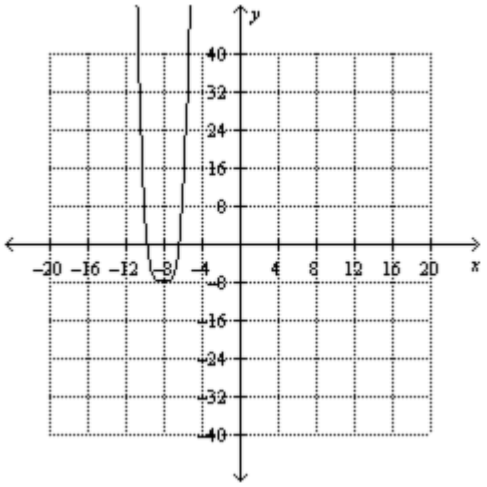
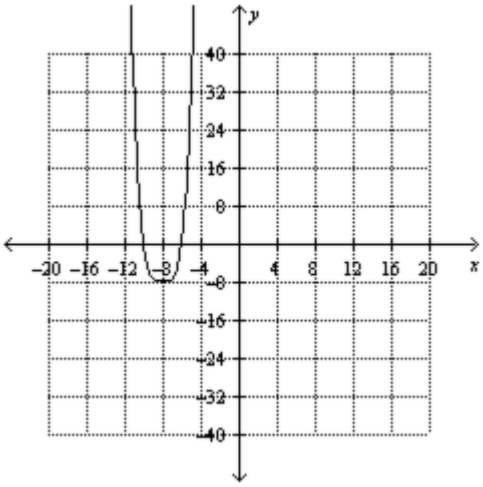
4. Graph $f(x) = \frac{1}{2}(x-8)^4 - 8$.

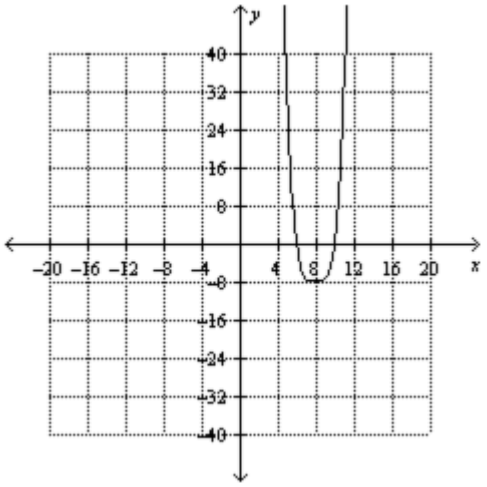
a.



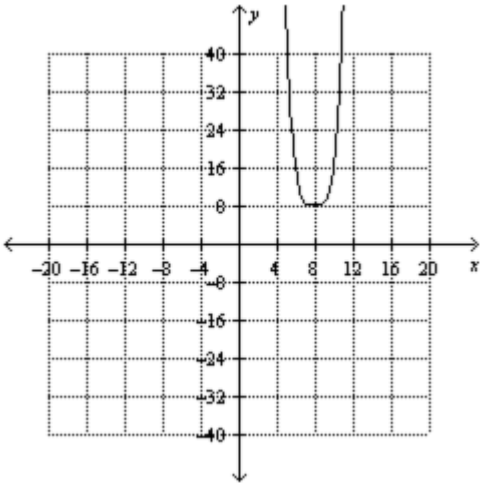
b.



c.



d.



5. Use a sign chart to solve $(2x + 3)(x + 8) \geq 0$.

a. $(-8, -\frac{3}{2})$

b. $(-\infty, -8]$ or $[-\frac{3}{2}, \infty)$

c. $(-\infty, -8)$ or $(-\frac{3}{2}, \infty)$

d. $[-8, -\frac{3}{2}]$

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6. If cot $A = 8$, find the exact values of the remaining trigonometric functions for the acute angle A.

a. $\sin A = \frac{\sqrt{65}}{8}, \cos A = \sqrt{65}, \tan A = \frac{1}{8}, \sec A = \frac{\sqrt{65}}{65}, \csc A = \frac{8\sqrt{65}}{65}$

b. $\sin A = \frac{8\sqrt{65}}{65}, \cos A = \frac{\sqrt{65}}{65}, \tan A = \frac{1}{8}, \sec A = \sqrt{65}, \csc A = \frac{\sqrt{65}}{8}$

c. $\sin A = \frac{\sqrt{65}}{65}, \cos A = \frac{8\sqrt{65}}{65}, \tan A = \frac{1}{8}, \sec A = \frac{\sqrt{65}}{8}, \csc A = \sqrt{65}$

d. $\sin A = \frac{8\sqrt{65}}{65}, \cos A = \frac{\sqrt{65}}{65}, \tan A = \frac{1}{8}, \sec A = \frac{\sqrt{65}}{8}, \csc A = \sqrt{65}$

7. Determine which consecutive integers do *not* have a real zero of $f(x) = x^3 + 9x^2 + 8x - 5$ between them.

a. (–8, –7) b. (4, 5)
c. (0, 1) d. (–2, –1)

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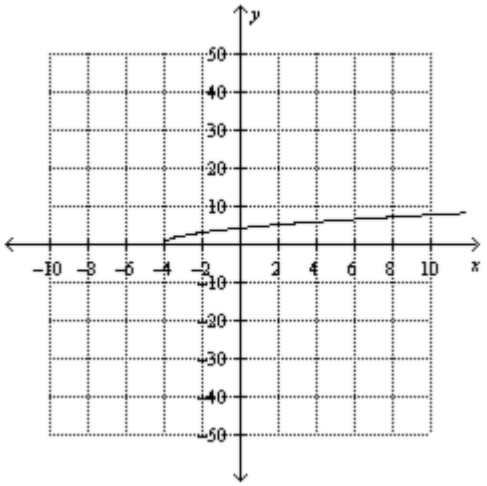
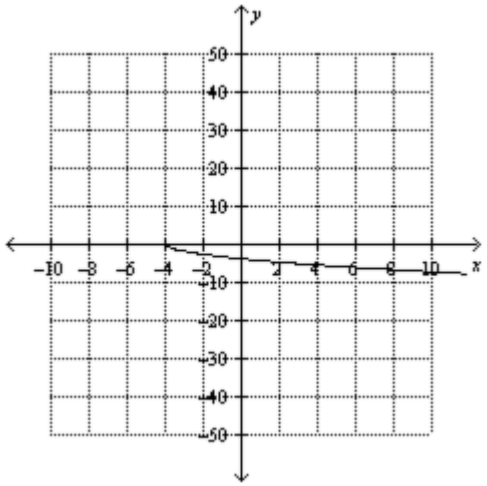
8. Graph $f(x) = 2\sqrt{x+4}$.

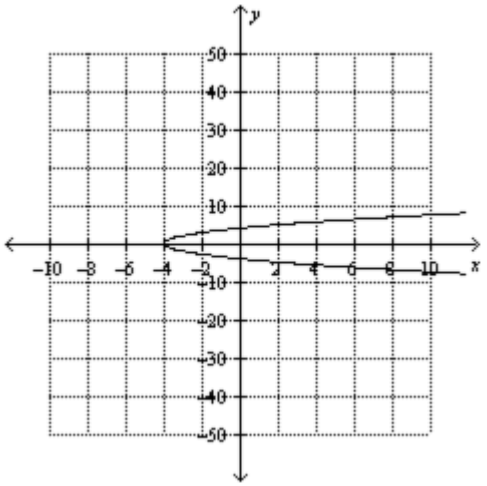
a.



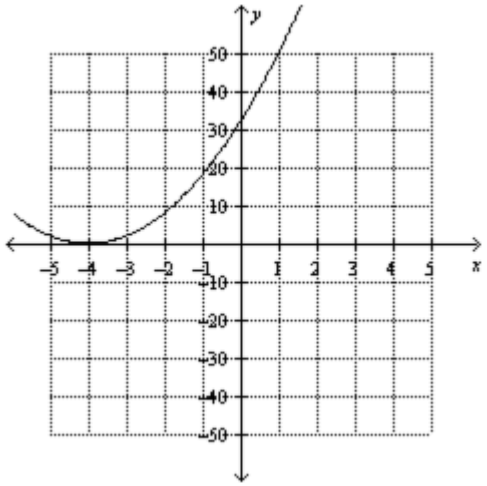
b.



c.



d.



9. Solve $e^{-5x} = 7.4$ for x correct to four decimal places.

a. –0.4003 b. 0.4003
c. 0.8692 d. –0.8692

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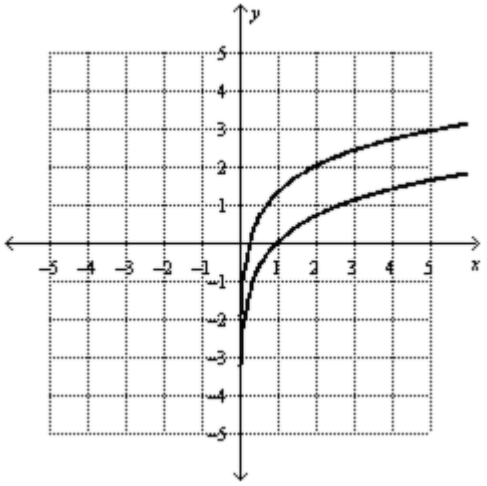
10. Use the graph of *f* to describe the transformation that results in the graph of *g*. Then sketch the graphs of *f* and *g*.

$f(x) = \ln x$, $g(x) = \ln\left(\frac{x}{2}\right) - 2$

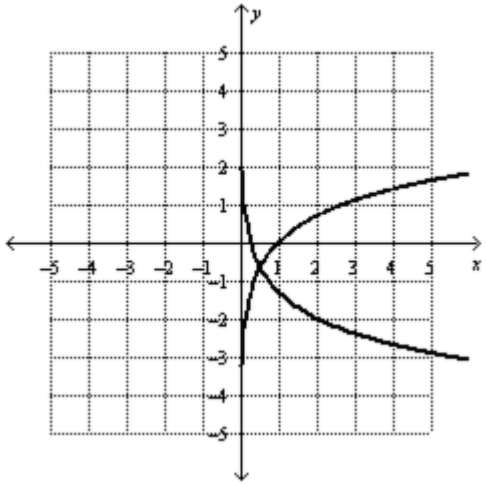
a. The graph of $g(x)$ is the graph of $f(x)$ shifted 2 units

up and compressed horizontally by a factor of $\frac{1}{2}$

.

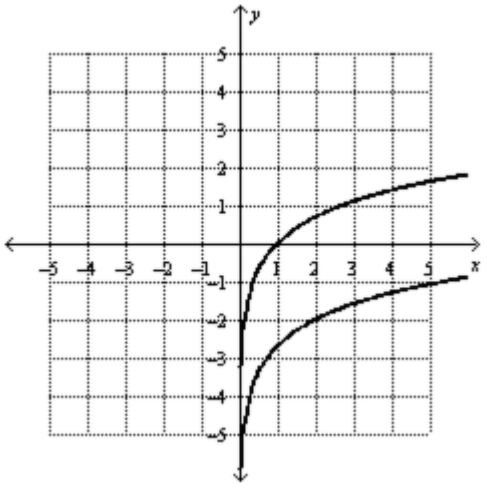


b. The graph of $g(x)$ is the graph of $f(x)$ reflected over the x-axis.

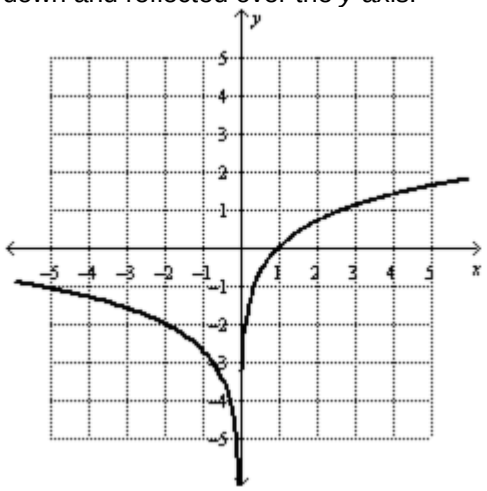


c. The graph of $g(x)$ is the graph of $f(x)$ shifted 2 units

down and compressed horizontally by a factor of $\frac{1}{2}$.



d. The graph of $g(x)$ is the graph of $f(x)$ shifted 2 units down and reflected over the y-axis.



11. Use a power function to model the data and estimate y for $x = 11$.

x	y
1	2
2	32
3	162
4	512
5	1,250
6	2,592
7	4,802
8	8,192

a. 11,582 b. 20,000
c. 41,472 d. 29,282

12. As automobiles age, the average miles traveled per gallon decreases. Determine the regression equation that best models the data.

Age (years)	MPG
1	35
3	34
5	33
7	31
9	28
11	26
13	23
15	18

a. power b. logarithmic
c. quadratic d. exponential

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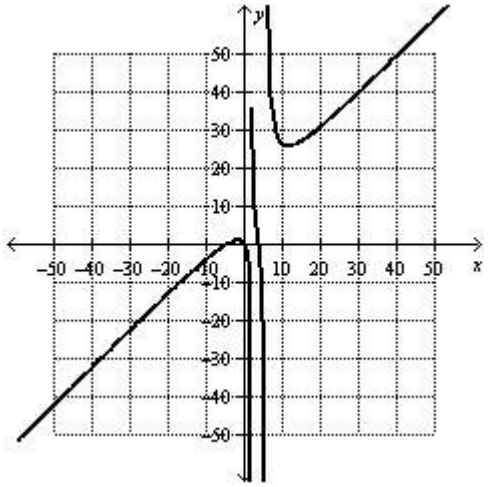
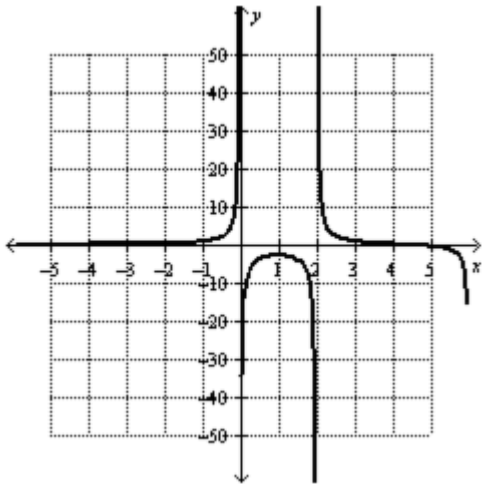
13. Graph $f(x) = \dfrac{x(x-4)(x+4)}{x^2-8x+12}$

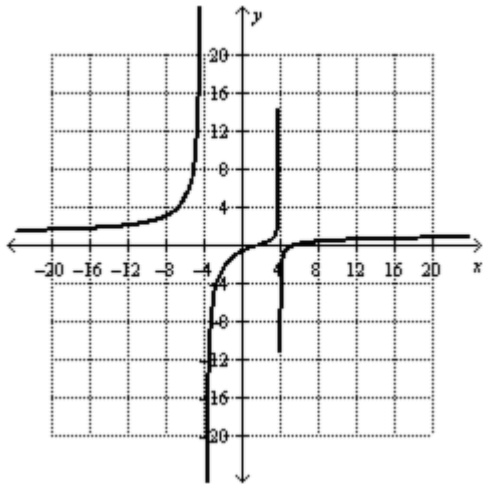
a.



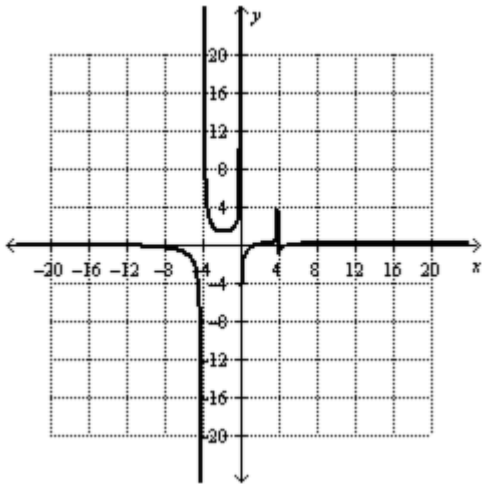
b.



c.



d.



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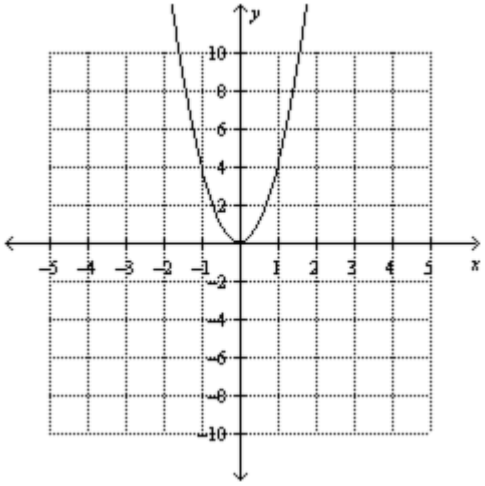
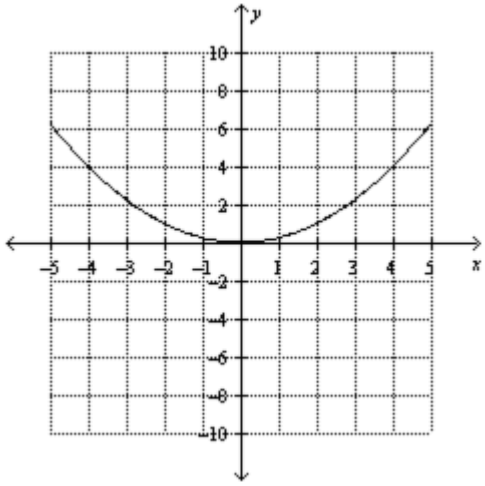
14. Graph $h(x) = -4x^2$

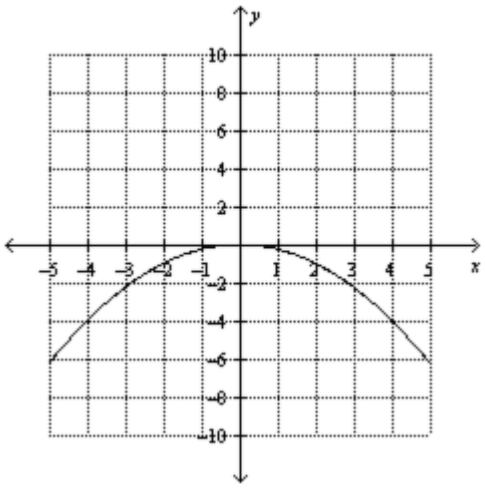
a.



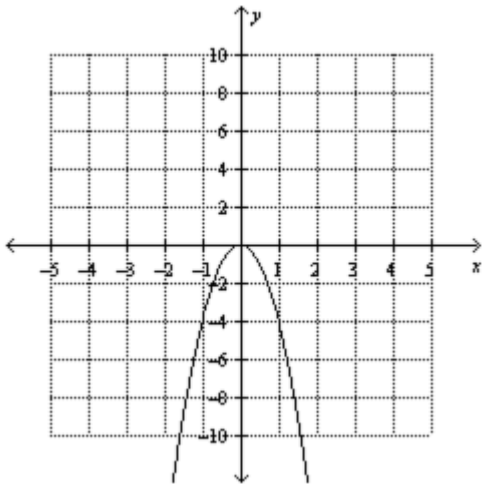
b.



c.



d.



15. $\frac{2y+1}{5} - \frac{2+7y}{15} > \frac{2}{3}$

a. $y > -9$ b. $y < -9$
c. $y > 0$ d. $y > 0$ or $y < -9$

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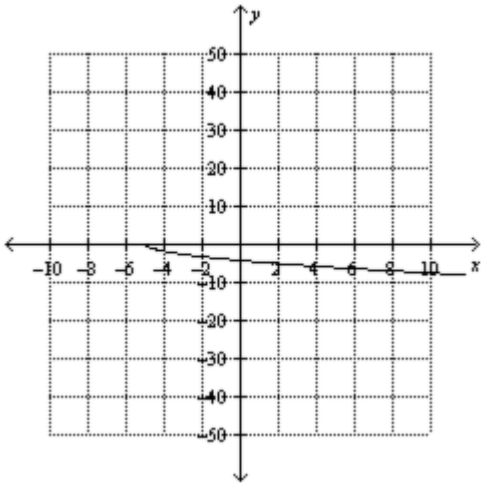
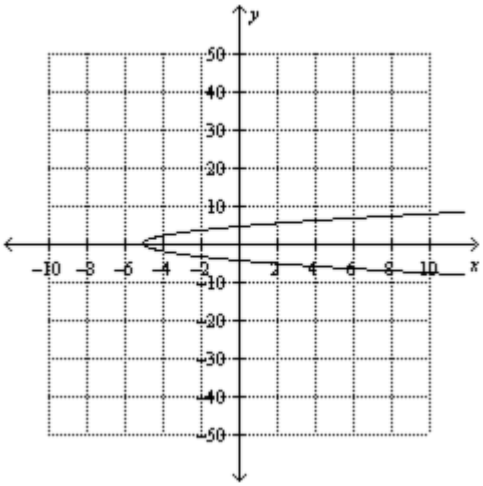
16. Graph $f(x) = 2\sqrt{x+5}$.

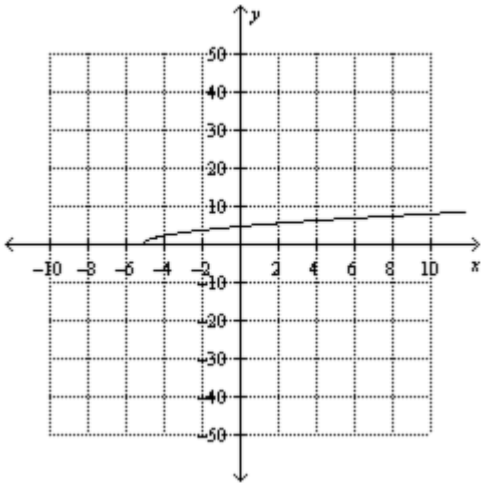
a.



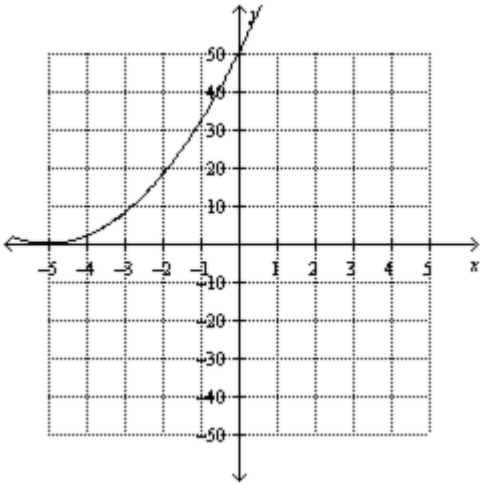
b.



c.



d.



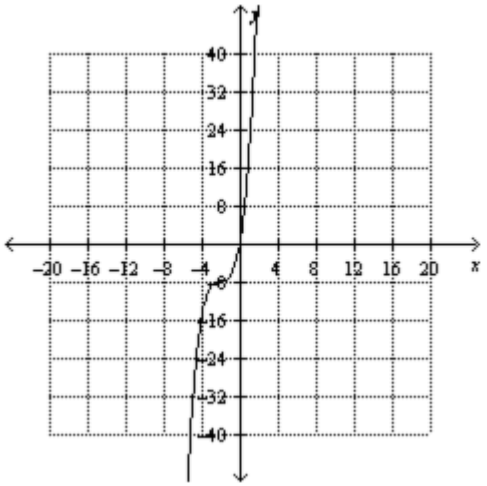
17. Use the end behavior of the graph to solve $x^3 - x^2 - 2x > 0$.

a. $(-\infty, -1)$ or $(0, 2)$ b. $(-1, 0)$

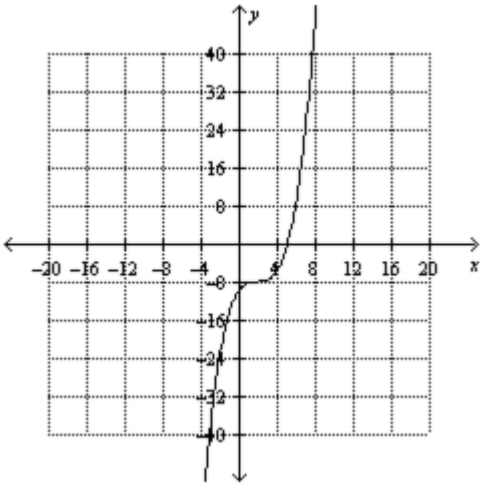
c. $(-1, 0)$ or $(2, \infty)$ d. $(0, 2)$

18. Graph $f(x) = \frac{1}{4}(x-2)^3 - 8$.

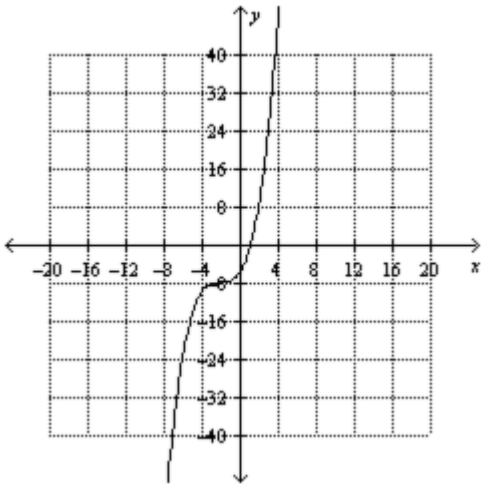
a.



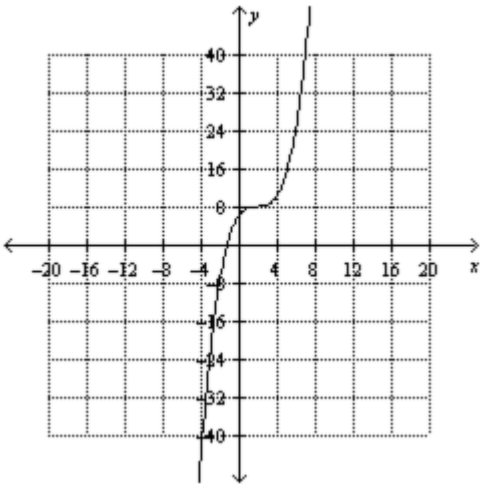
b.



c.



d.



Find the area of each sector.

19. $\theta = \frac{7\pi}{4}$, r = 4 m

a. 88.0 m^2

b. 2520 m^2

c. 44.0 m^2

d. 22.0 m^2

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Expand each expression.

20. $\log_2 [(2x)^3(x + 1)]$

a. $3 + 3 \log_2 x \times \log_2 (x + 1)$

b. $3 + 3 \log_2 (2x + 1)$

c. $3 + 2 \log_3 x + \log_2 (x + 1)$

d. $3 + 3 \log_2 x + \log_2 (x + 1)$

21. Describe the end behavior of the graph of $f(x) = x^3(x + 3)(–5x + 1)$ using limits.

a. As $x \to -\infty$, $f(x) \to -\infty$
As $x \to +\infty$, $f(x) \to +\infty$

b. As $x \to -\infty$, $f(x) \to +\infty$
As $x \to +\infty$, $f(x) \to +\infty$

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

d. As $x \to -\infty$, $f(x) \to +\infty$
As $x \to +\infty$, $f(x) \to -\infty$

22. Find the domain of and the equations of any vertical or horizontal asymptotes for $g(x) = \dfrac{x^2 + 6x + 9}{x + 3}$.

a. D = $\{x \mid x \neq –3, x \in P\}$; vertical asymptote: $x = 3$

b. D = $\{x \mid x \neq 3, x \in P\}$; vertical asymptote: $x = 3$

c. D = $\{x \mid x \neq 3, x \in P\}$; vertical asymptote: $x = –3$

d. D = $\{x \mid x \neq –3, x \in P\}$; vertical asymptote: $x = –3$

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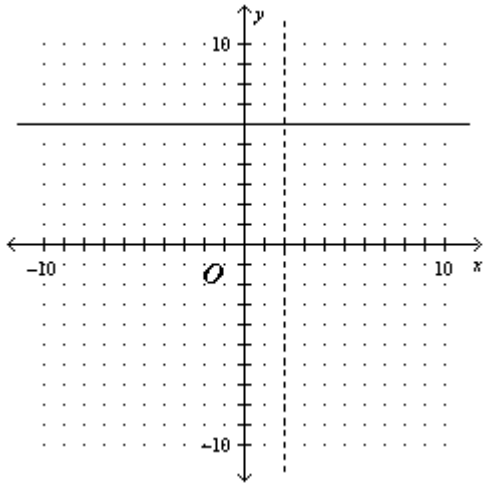
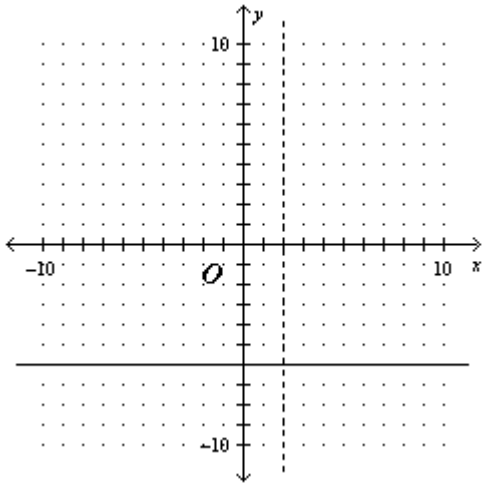
23. Which is a graph of $f(x) = \dfrac{-6x+1}{x-2}$, with any vertical or horizontal asymptotes indicated by dashed lines?

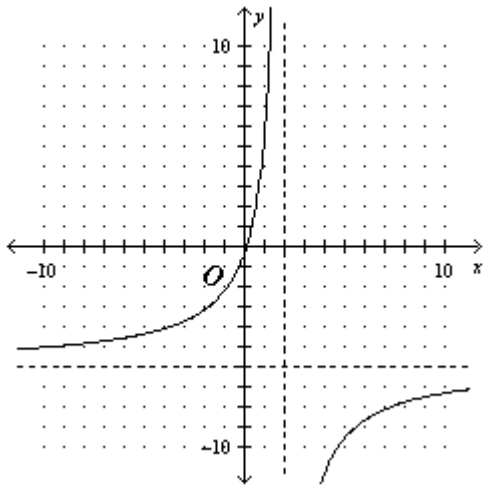
a.



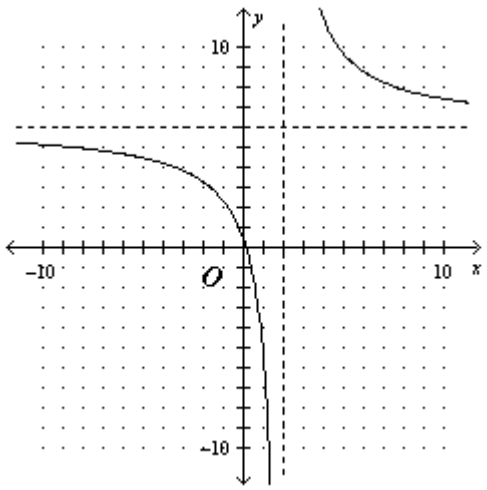
b.



c.



d.



24. Find the vertical, horizontal, and oblique asymptotes, if any, for $f(x) = \dfrac{2x^3 - 26x^2 + 89x - 60}{x^2 - 12x + 32}$.

a. vertical: $x = 8,\ x = 4$
slant: $y = 2x - 2$

b. vertical: $x = -8,\ x = -4$
slant: $y = 2x + 2$

c. horizontal: $y = 0$
slant: $y = 2x - 2$

d. vertical: $x = 8,\ x = -4$
horizontal: $y = 0$

25. Use the end behavior of the graph to solve $3x^3 + 9x^2 - 12x < 0$.

a. $(0, 1)$

b. $(-4, 0)$

c. $(-4, 0)$ or $(1, \infty)$

d. $(-\infty, -4)$ or $(0, 1)$

26. State the number of possible real zeros and turning points of $f(x) = x^4 - 13x^2 + 36$. Then determine all of the real zeros by factoring.

a. 4 real zeros and 3 turning points; –3, 3
b. 4 real zeros and 3 turning points; –3, –2, 2, 3
c. 4 real zeros and 4 turning points; –7, –2, 2, 7
d. 4 real zeros and 3 turning points; –3, 2

27. Determine the equation whose roots are –3, 3, and 3.

a. $x^3 + 3x^2 - 9x + 27 = 0$ b. $x^3 - 3x^2 - 9x + 27 = 0$
c. $x^3 - 9x^2 - 9x + 27 = 0$ d. $x^3 - 9x^2 + 27x + 27 = 0$

28. Use the end behavior of the graph to solve $-2x^3 - 11x^2 + 6x > 0$.

a. $\left(0, \frac{1}{2}\right)$ b. $(-6, 0)$
c. $(-6, 0)$ or $\left(\frac{1}{2}, \infty\right)$ d. $(-\infty, -6)$ or $\left(0, \frac{1}{2}\right)$

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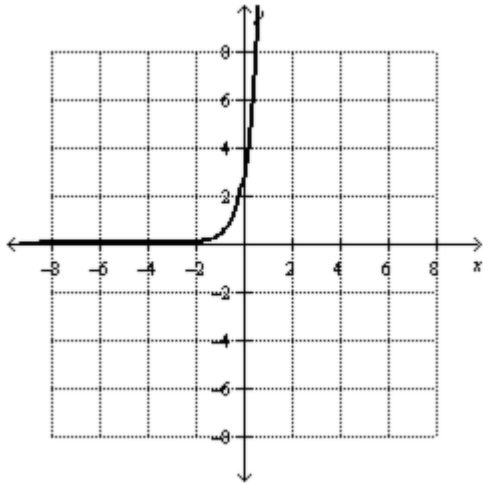
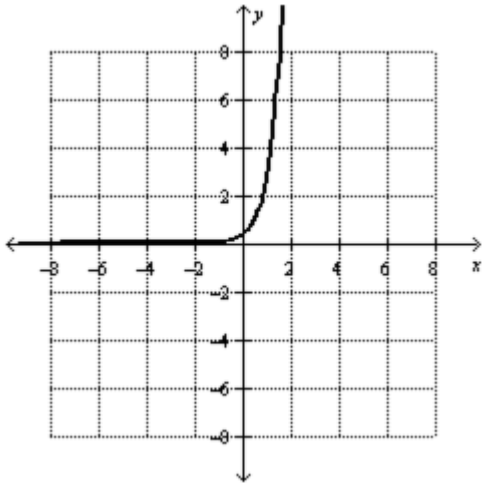
Sketch and analyze the graph of each function. Describe its domain, range, intercepts, asymptotes, end behavior, and where the function is increasing or decreasing.

29. $g(x) = e^{2x + 1}$

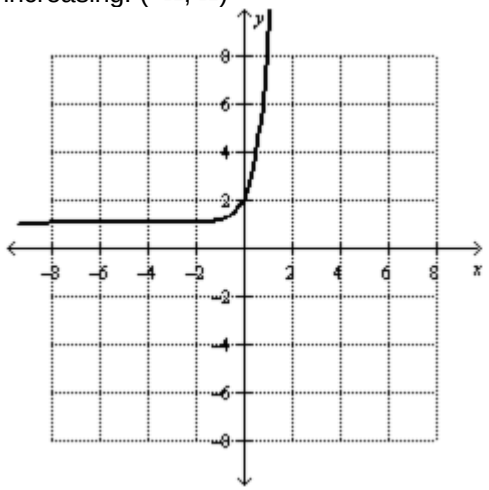
a. D = (–∞, ∞); R = (0, ∞);
y-intercept: (0, *e*) or (0, 2.72); *x*-intercept: none;
asymptote: *x*-axis; end behavior: $\lim_{x \to -\infty} f(x) = 0$ and $\lim_{x \to \infty} f(x) = \infty$; increasing: (–∞, ∞)



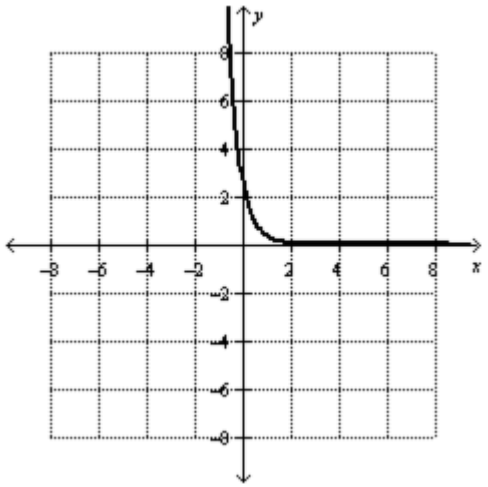
b. D = (–∞, ∞); R = (0, ∞);
y-intercept: (0, 0.3); *x*-intercept: none; asymptote: *x*-axis; end behavior: $\lim_{x \to -\infty} f(x) = 0$ and $\lim_{x \to \infty} f(x) = \infty$; increasing: (–∞, ∞)



c. D = (–∞, ∞); R = (–∞, ∞);
y-intercept: (0, 2); *x*-intercept: none; asymptote: *x* = 1; end behavior: $\lim_{x \to -\infty} f(x) = 1$ and $\lim_{x \to \infty} f(x) = \infty$; increasing: (–∞, ∞)



d. D = (–∞, ∞); R = (0, ∞);
y-intercept: (0, *e*) or (0, 2.72); *x*-intercept: none;
asymptote: *x*-axis; end behavior: $\lim_{x \to -\infty} f(x) = \infty$ and $\lim_{x \to \infty} f(x) = 0$; decreasing: (∞, –∞)



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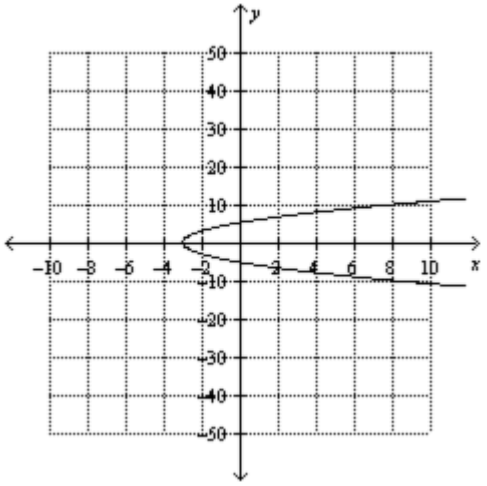
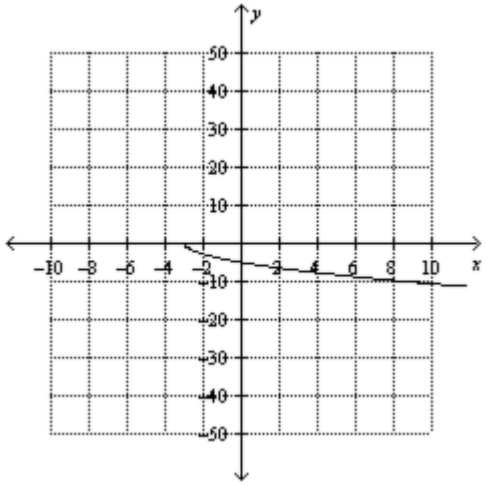
30. Graph $f(x) = 3\sqrt{x+3}$.

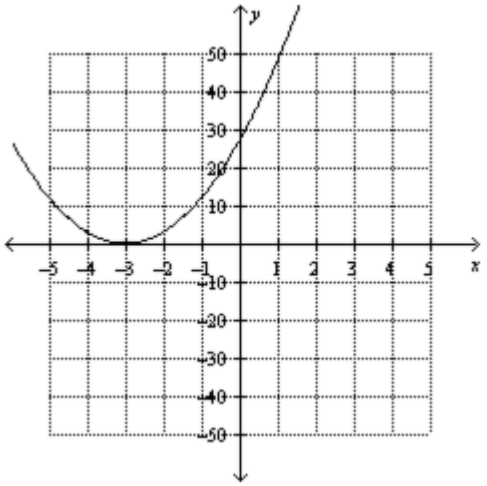
a.



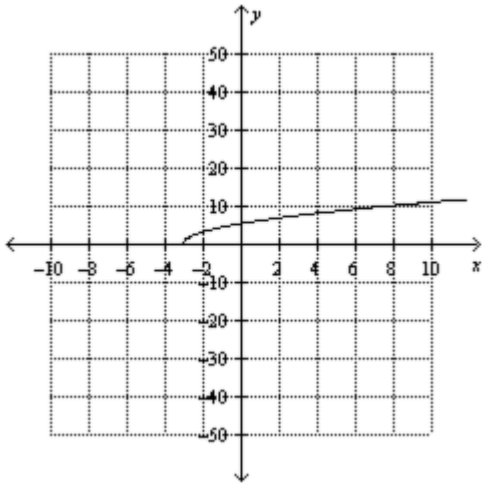
b.



c.



d.



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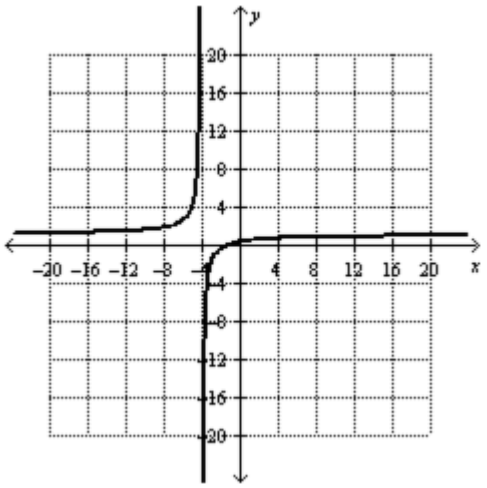
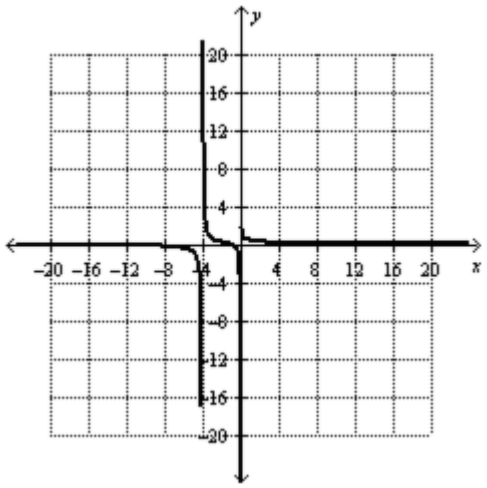
31. Graph $f(x) = \dfrac{x(x+2)(x+4)}{x^2+3x+2}$

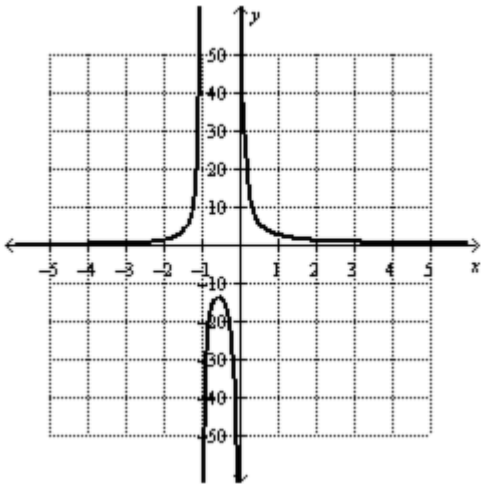
a.



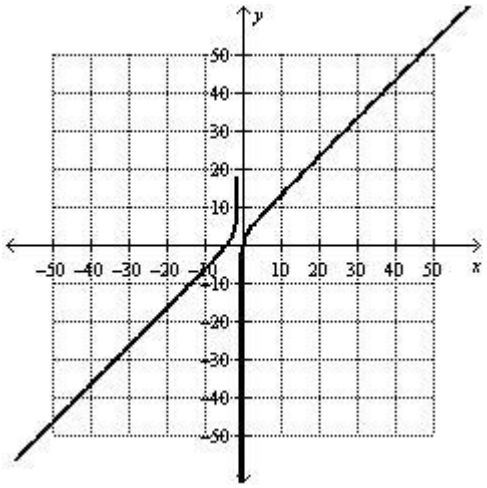
b.



c.



d.



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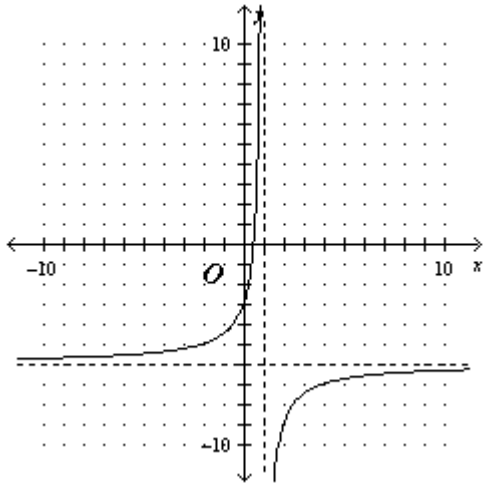
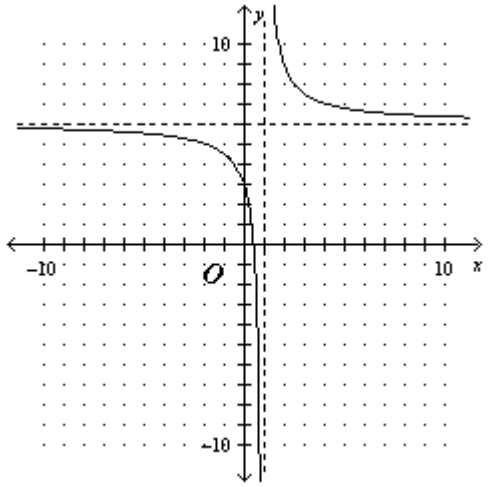
32. Which is a graph of $f(x) = \dfrac{6x-3}{x-1}$, with any vertical or horizontal asymptotes indicated by dashed lines?

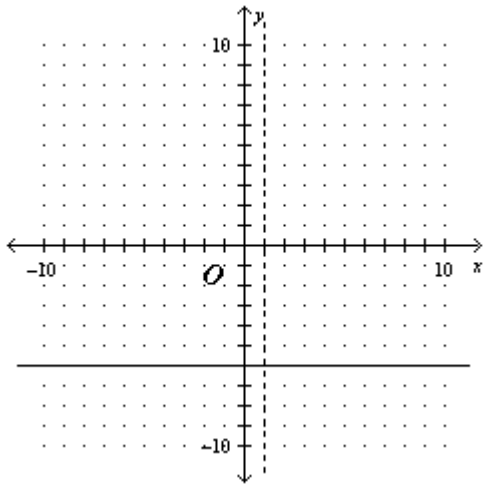
a.



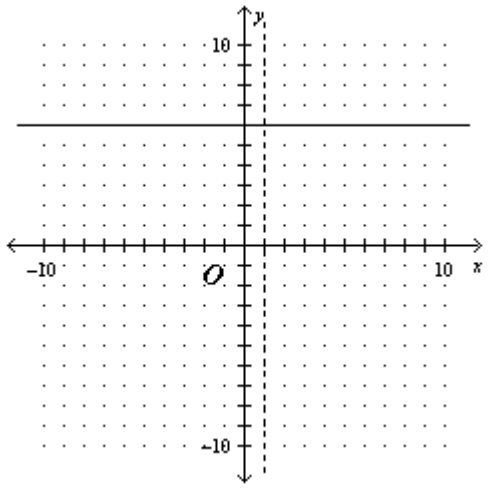
b.



c.



d.

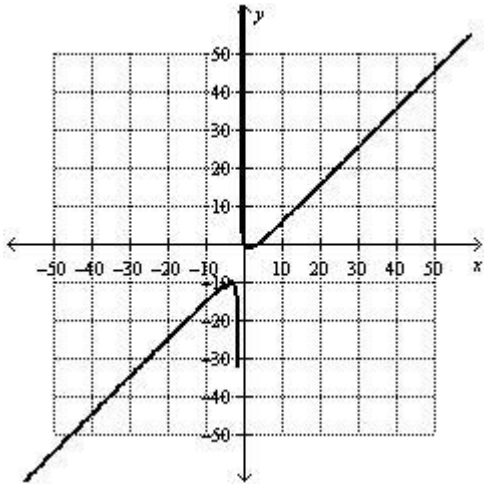


33. Solve $\log_6 x = 2$

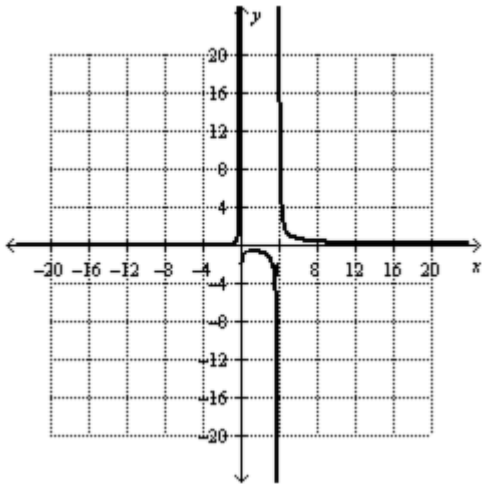
a. 36 b. 12
c. 6 d. 64

34. Graph $f(x) = \dfrac{x(x-2)(x-4)}{x^2-x-2}$

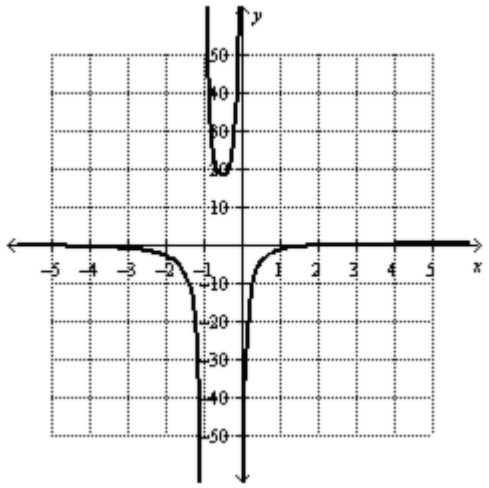
a.



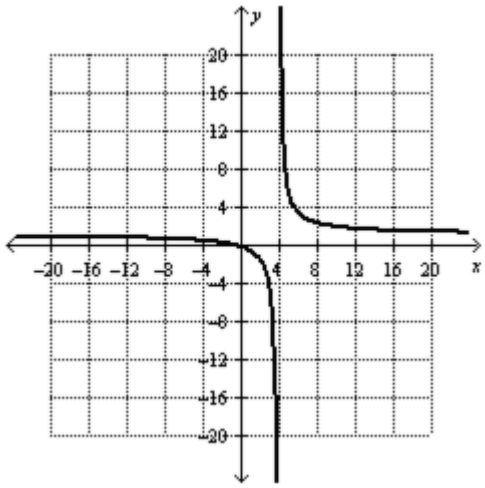
b.



c.



d.

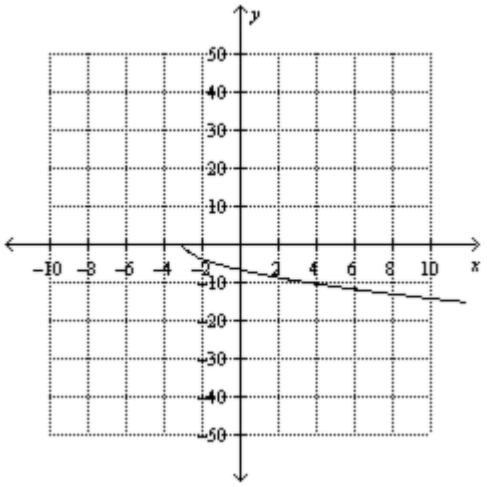


35. Find the domain of and the equations of any vertical or horizontal asymptotes for $g(x) = \dfrac{x^2-x-6}{x-3}$.

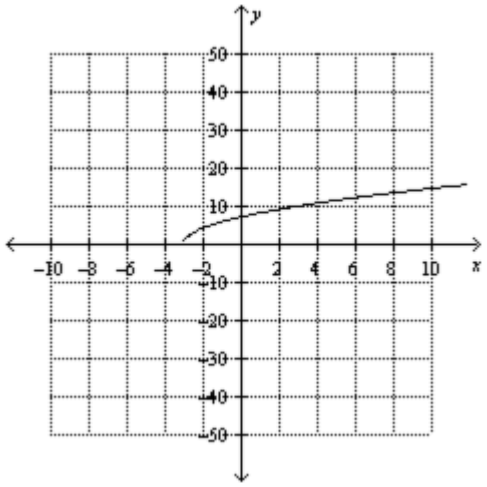
a. D = $\{x \mid x \neq 3, x \in \mathrm{P}\}$; vertical asymptote: $x = -2$
b. D = $\{x \mid x \neq -3, x \in \mathrm{P}\}$; vertical asymptote: $x = -2$
c. D = $\{x \mid x \neq -3, x \in \mathrm{P}\}$; vertical asymptote: $x = 2$
d. D = $\{x \mid x \neq 3, x \in \mathrm{P}\}$; vertical asymptote: $x = 2$

36. Graph $f(x) = 4\sqrt{x+3}$.

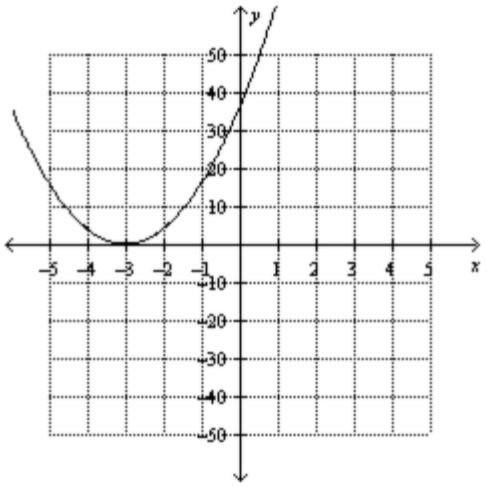
a.



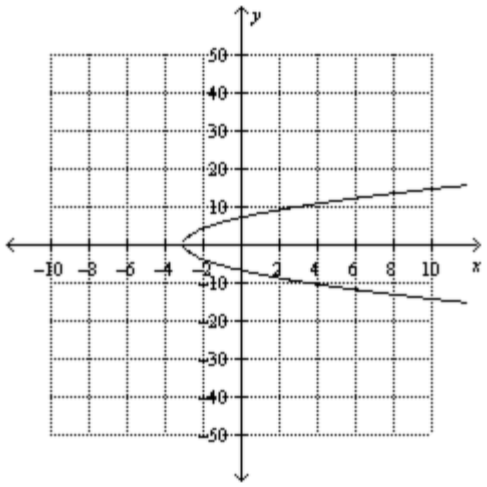
b.



c.



d.



Find each *f*(*c*) using synthetic substitution.

37. $f(x) = 2x^5 + 10x^4 + 4x^3 - x^2 - 2x + 6$; $c = -5$

a. 121 b. 11,991
c. –509 d. 12,971

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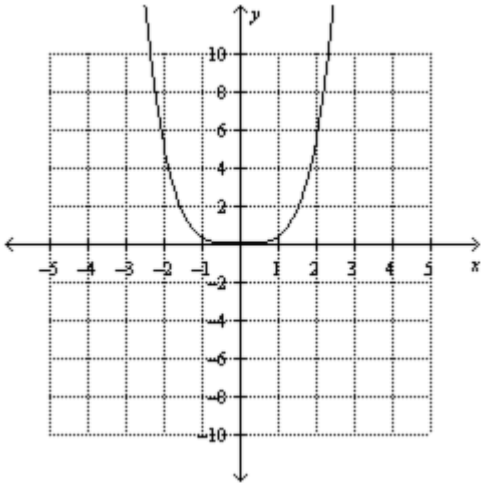
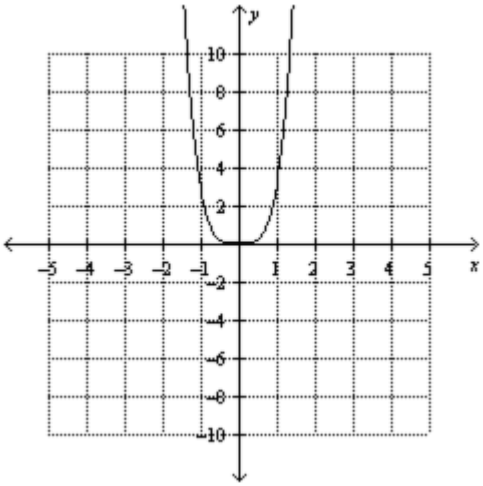
38. Graph $g(x) = \frac{1}{3}x^4$.

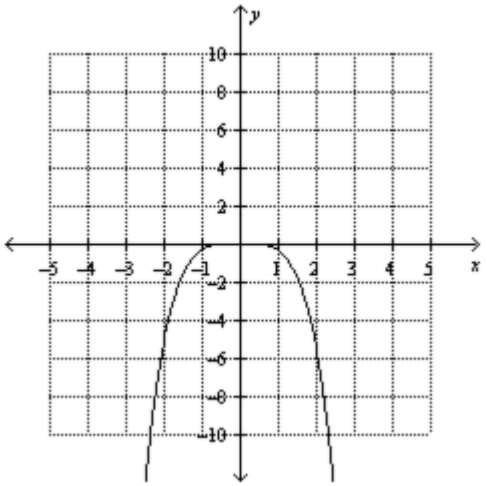
a.



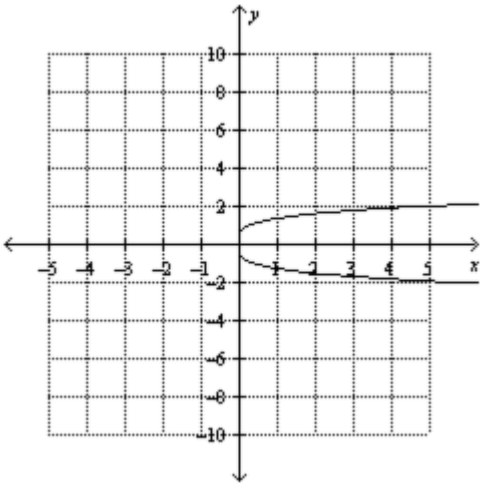
b.



c.

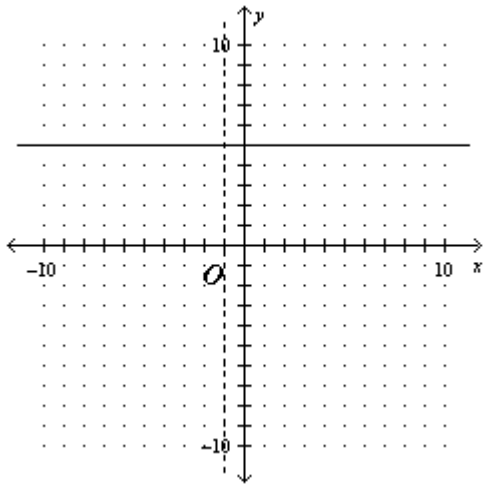


d.

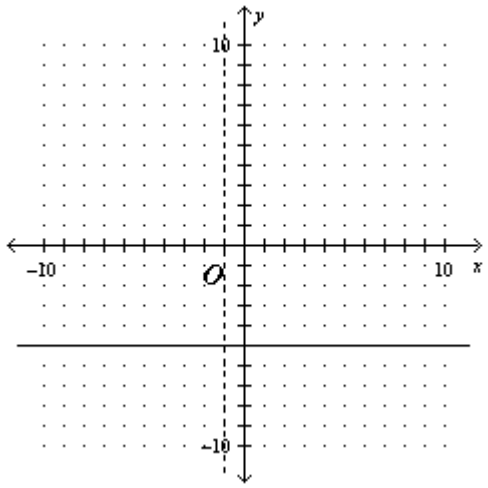


39. Which is a graph of $f(x) = \frac{-5x-1}{x+1}$, with any vertical or horizontal asymptotes indicated by dashed lines?

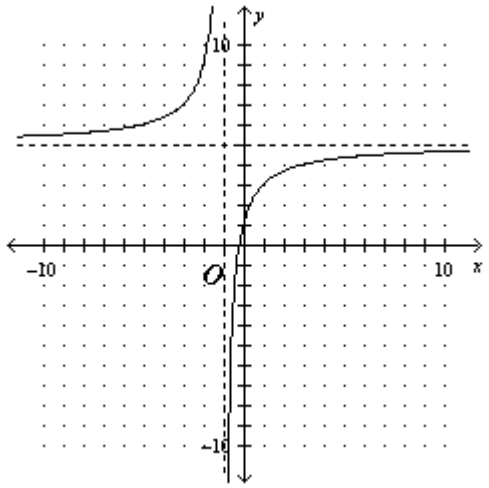
a.



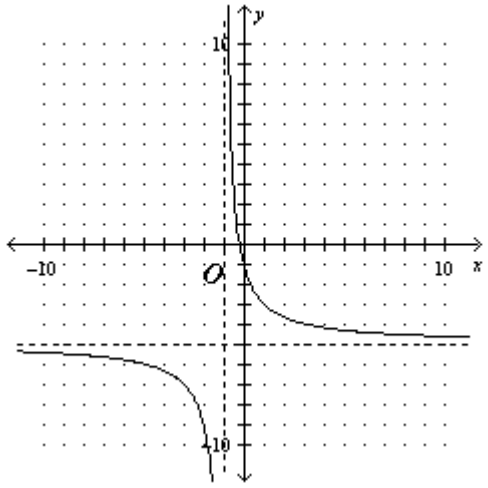
b.



c.



d.



40. Solve.

$\sqrt{5x-4} + 1 = 11$

a. $\frac{104}{5}$ b. $\frac{124}{5}$

c. 25 d. $\frac{14}{5}$

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Find each *f*(*c*) using synthetic substitution.

41. $f(x) = -x^7 + 4x^6 - 4x^5 - 6x^4 - 3x^3 - 6x^2 - x - 2$; $c = -5$

a. 149,603 b. –1,792
c. –16,022 d. –32,407

42. Factor $x^3 - 3x^2 - 4x + 12$ completely using long division if $(x - 2)$ is a factor.

a. $(x - 2)(x - 2)(x + 3)$ b. $(x - 2)(x + 2)(x + 3)$
c. $(x - 2)(x + 2)(x - 3)$ d. $(x - 2)(x - 2)(x - 3)$

Solve each inequality. Round to the nearest hundredth.

43. $3x^2 - 4 \leq 6 - 5x$

a. $-2.84 \leq x \leq 1.17$ b. no solution
c. infinite solutions d. $x \leq -2.84$ or $x \geq 1.17$

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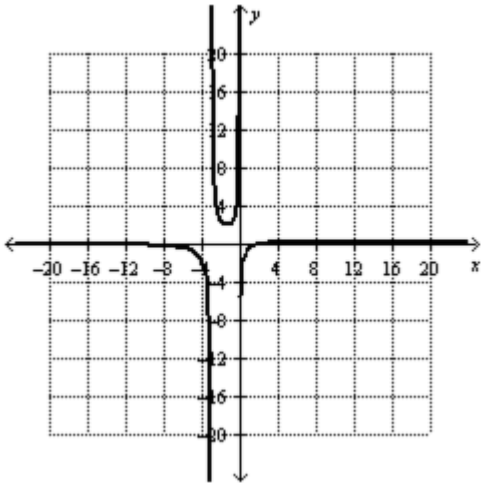
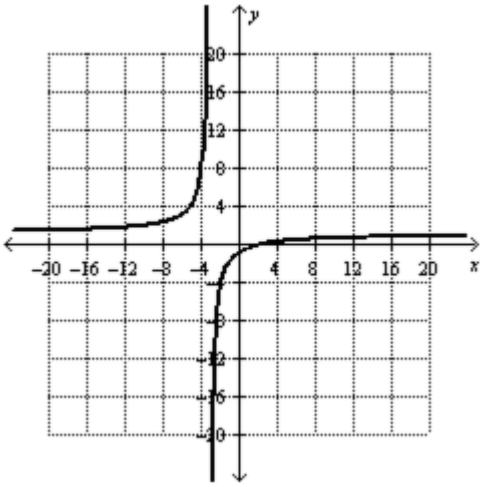
44. Graph $f(x) = \dfrac{x(x-2)(x+3)}{x^2-5x+6}$

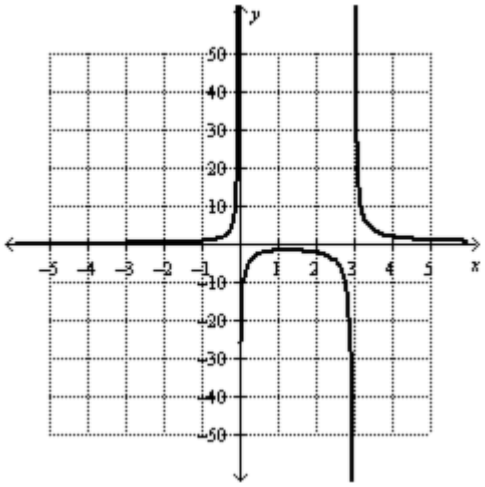
a.



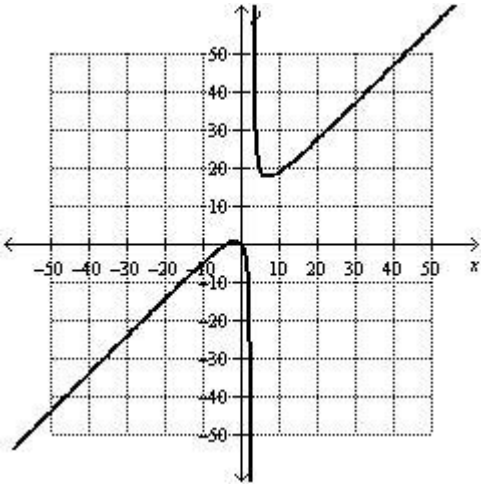
b.



c.



d.



Evaluate each expression.

45. $2 \ln e^5$

a. 10

b. 1.397

c. 5

d. 148.413

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Divide using long division.

46. $(6x^6 - 3x^5 + 15x^4 - 21x^3 + 15x^2 - 3x - 5) \div (-3x + 3)$

a. $-2x^5 - x^4 - 6x^3 + x^2 - 4x - 3 + \frac{4}{-3x + 3}$

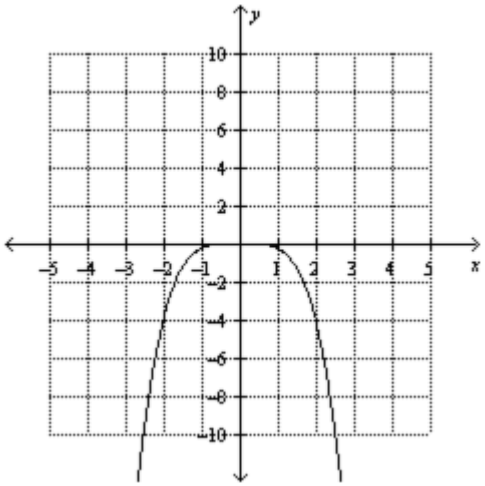
b. $-2x^5 - x^4 - 6x^3 + x^2 - 4x - 3 + 4$

c. $-2x^5 - x^4 - 6x^3 + x^2 - 4x - 3 - \frac{4}{-3x + 3}$

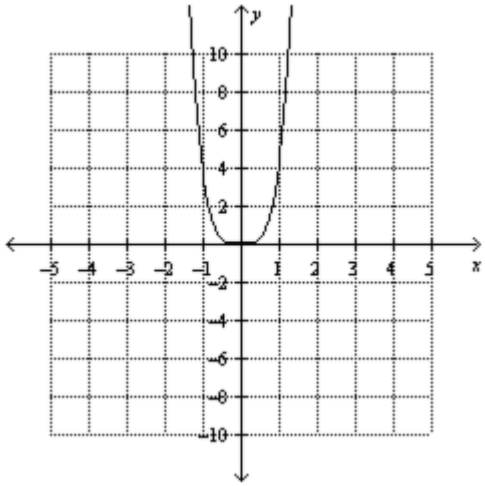
d. $-2x^5 - x^4 - 6x^3 + x^2 - 4x + 1$

47. Graph $g(x) = \frac{1}{4}x^4$.

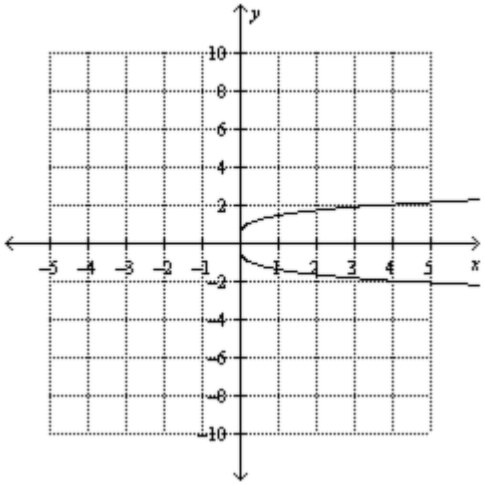
a.



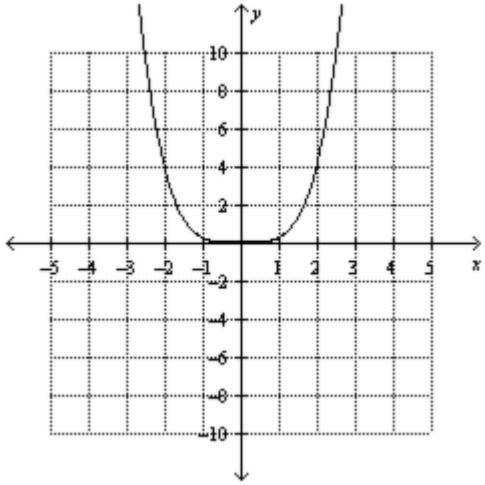
b.



c.



d.



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Describe the possible real zeros of each function.

48. $f(x) = 4x^3 - 9x^2 + 4x - 6$

a. 2 or 0 positive zeros and 1 negative zero
b. 0 positive zeros and 1 negative zero
c. 4, 2, or 0 positive zeros and 0 negative zeros
d. 4, 2, or 0 positive zeros and 1 negative zero

49. Solve.

$$\frac{x+3}{x-5} = \frac{x+7}{x-9}$$

a. 1 b. 8
c. –5 d. 2

50. Solve.

$$\sqrt{x+4} = x - 2$$

a. –9 b. –2, 3
c. 5 d. 0

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Answer Key

1. b

2. d

3. c

4. c

5. b

6. c

7. b

8. a

9. a

10. c

11. d

12. d

13. a

14. d

15. b

16. c

17. c

18. b

19. c

20. d

21. d

22. d

23. c

24. a

25. d

26. b

27. b

28. d

29. a

30. d

31. d

32. b

33. a

34. a

35. a

36. b

37. c

38. a

39. d

40. a

41. a

42. c

43. a

44. d

45. a

46. a

47. d

48. c

49. a

50. c