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Precalculus_G11_Semester1_

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

1. Which statement best describes how a graph of $y = 3|x|$ is related to the parent graph?

a. The graph is stretched vertically. b. The graph is stretched horizontally.
c. The graph is shrunk vertically. d. The graph is shrunk horizontally.

2. Choose the phrase that best describes the matrix.

$$\begin{bmatrix} 9 & 8 & -7 \\ -2 & -4 & 9 \\ -7 & 8 & -5 \end{bmatrix}$$

a. augmented matrix b. coefficient matrix
c. augmented matrix in row-echelon form d. none of the above

3. Use an inverse matrix to solve the system of equations, if possible.

$3x - 2y + z = -15$
$6x - 4y + 5z = -54$
$4x + 8y - z = -44$

a. $(-5, -4, -8)$ b. $(-7, 6, -8)$
c. $(-7, -5, -4)$ d. no solution

4. Use Cramer's Rule to find the solution of the system of linear equations, if a unique solution exists.

$-4x - y + z = -31$
$-3x - y + 3z = -29$
$-x + 2y - 2z = 8$

a. (4, –6, 6) b. (6, 5, –2)
c. (4, –3, –2) d. no unique solution

5. Identify the function for which an inverse function exists.

a. $f(x) = 5x^2 - 3$ b. $f(x) = |x - 1|$
c. $f(x) = \sqrt{x + 2}$ d. $f(x) = [[x + 5]]$

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Which statement best describes a method that can be used to sketch the graph.

6. $y = |x + 1|$

a. Translate the graph of $y = |x|$ one unit up.
b. Translate the graph of $y = |x|$ one unit down.
c. Translate the graph of $y = |x|$ one unit left.
d. Translate the graph of $y = |x|$ one unit right.

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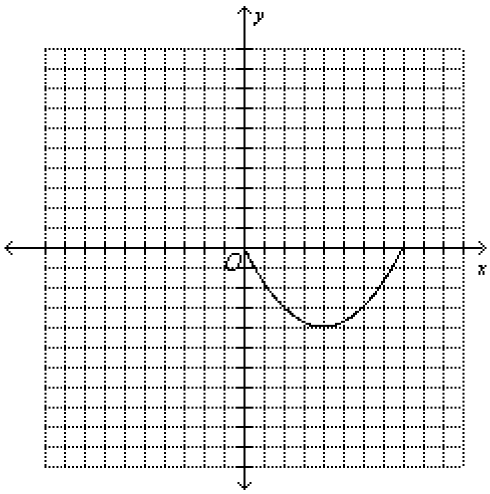
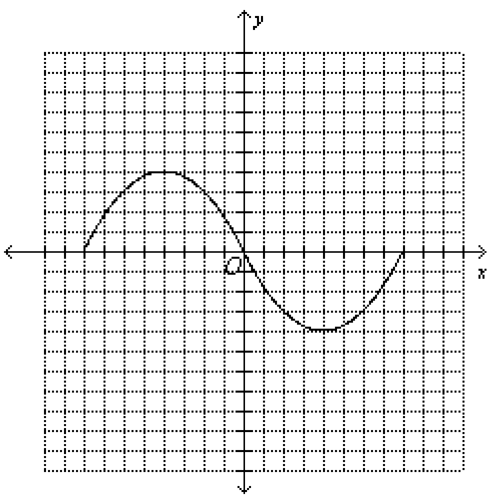
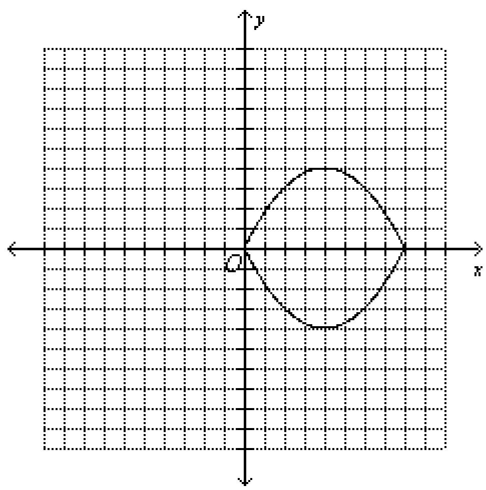
7. The graph below is a portion of a complete graph. Which graph below is the complete graph assuming it is an even function?



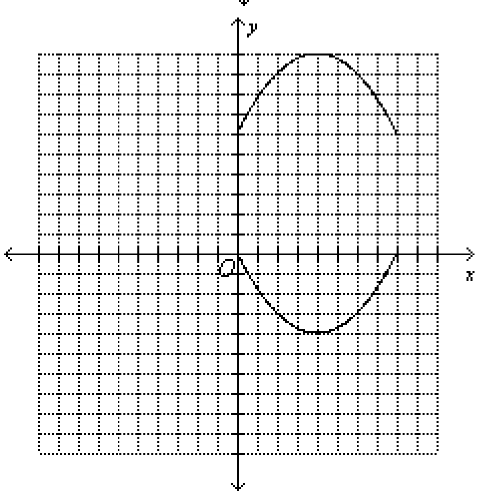
a.



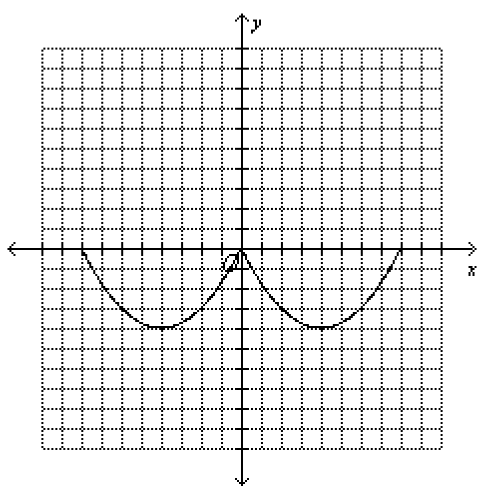
b.



c.



d.



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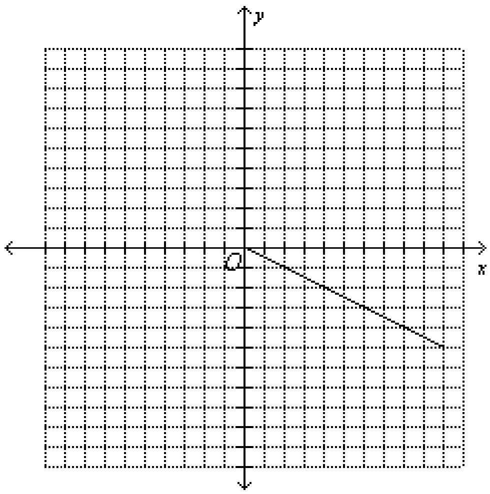
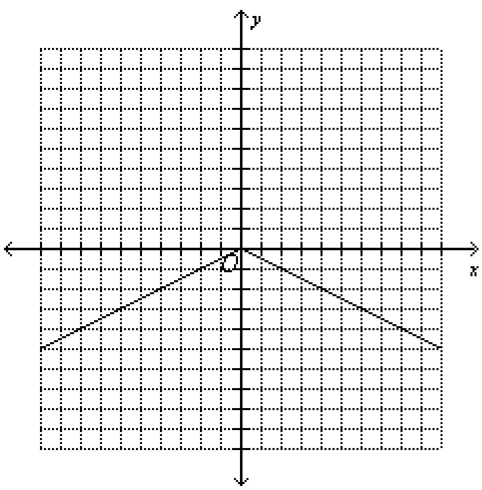
Precalculus_G11_Semester1_

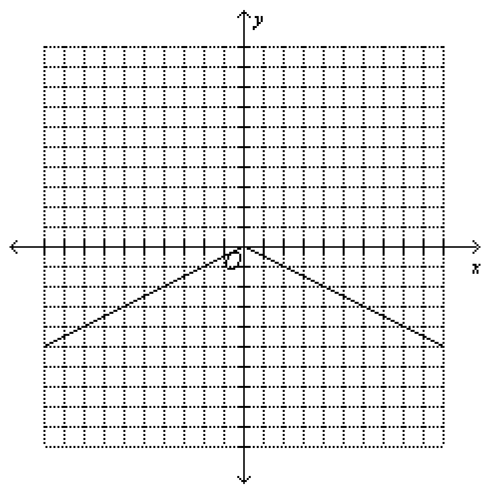
8. The graph below is a portion of a complete graph. Which graph below is the complete graph assuming it is an even function?



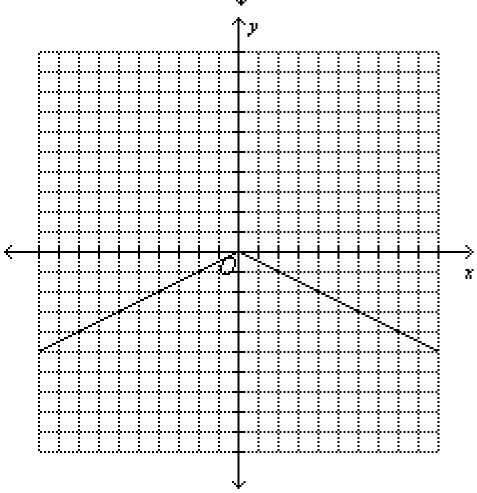
a.



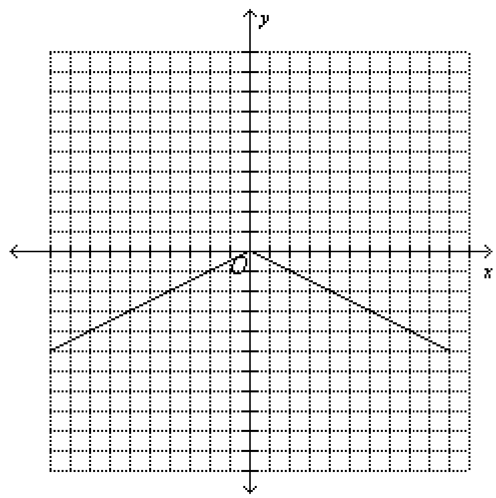
b.



c.



d.



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Find the maximum and minimum values of the objective function *f*(*x*, *y*) and for what values of *x* and *y* they occur, subject to the given constraints.

9. $f(x, y) = 4x + 6y$
$y \le -4x - 4$
$y \lesseqgtr 2x - 10$
$y \ge -4x + 20$

a. min at $(1, -8) = -44$, max at $(5, 0) = 20$
b. min at $(1, -8) = -44$, no max
c. max at $(1, -8) = -44$, no min
d. max at $(5, 0) = 20$, no min

10. Simplify $\dfrac{1 - \sec^2\theta}{\tan^2\theta}$.

a. $\tan^2\theta$
b. $\csc^2\theta$
c. –1
d. 1

Find the maximum and minimum values of the objective function *f*(*x*, *y*) and for what values of *x* and *y* they occur, subject to the given constraints.

11. $f(x, y) = 2x + 6y$
$x \ge 0$
$y \ge 0$
$2x + 7y \le 70$
$8x + 4y \le 136$

a. max at $(14, 6) = 64$, min at $(0, 0) = 0$
b. max at (15, 9) = 84, min at (0, 0) = 0
c. max at $(0, 10) = 60$, min at $(0, 0) = 0$
d. max at $(17, 0) = 34$, min at $(0, 0) = 0$

12. Solve the system of equations.

$-10x - 24y + 80z = 396$
$-2x - 7y + 27z = 103$
$21x + 72y - 276z = -1068$

a. $x = -6$, $y = 7$, $z = 3$
b. $x = -8$, $y = -1$, $z = -1$
c. infinite solutions
d. no solution

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13. Which statement is true for the graph of $f(x) = 2x^3 - 6x^2 - 48x + 24$?

a. (4, –140) is a relative minimum; (–2, 77) is a relative maximum
b. (4, –136) is a relative minimum; (–2, 80) is a relative maximum
c. (–2, 80) is a relative minimum; (4, –136) is a relative maximum
d. (–2, 77) is a relative minimum; (4, –140) is a relative maximum

14. Solve the matrix equation by using inverse matrices.

$$\begin{bmatrix} 5 & 2 \\ -2 & 3 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 4 \\ 25 \end{bmatrix}$$

a. (2, –7)
b. $\left(\frac{4}{7}, 25\right)$
c. $\left(\frac{18}{5}, 7\right)$
d. (–2, 7)

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

a. $\left(-8, -\frac{3}{2}\right)$
b. $(-\infty, -8]$ or $\left[-\frac{3}{2}, \infty\right)$
c. $(-\infty, -8)$ or $\left(-\frac{3}{2}, \infty\right)$
d. $\left[-8, -\frac{3}{2}\right]$

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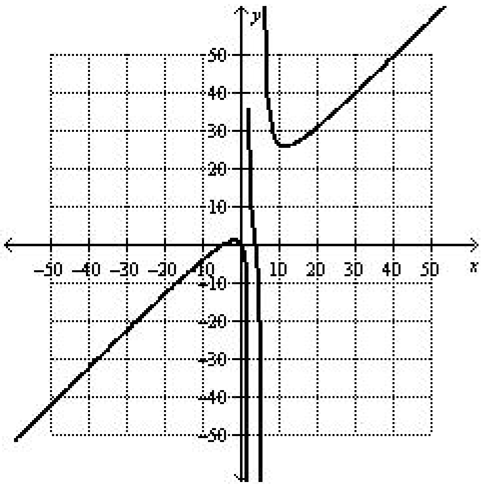
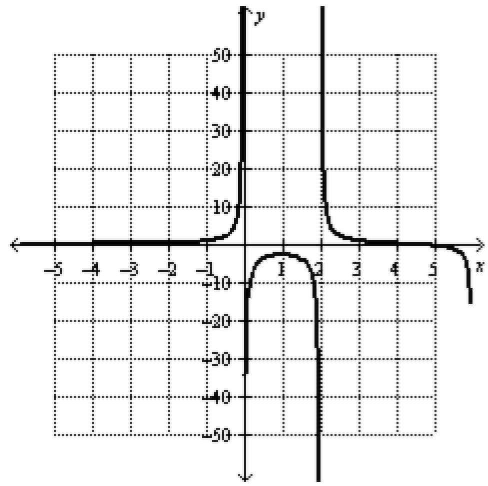
16. Graph $f(x) = \dfrac{x(x-4)(x+4)}{x^2 - 8x + 12}$

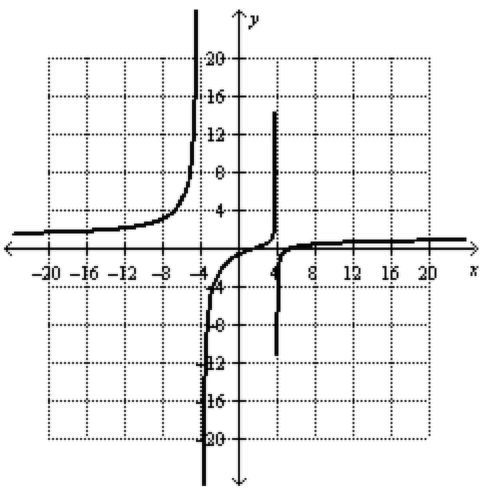
a.



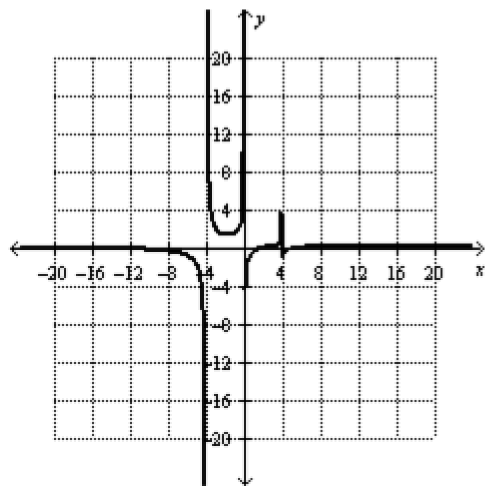
b.



c.



d.



17. In the first week of its release, the latest blockbuster movie sold \$16.3 million dollars in tickets. The movie's producers use the formula $P_t = P_0 e^{-0.4t}$, to predict the number of ticket sales *t* weeks after a movie's release, where P_0 is the first week's ticket sales. What are the predicted ticket sales to the nearest \$0.1 million for the sixth week of this movie's release? (Note: *t* = 0 for the *first* week.)

a. \$0.2 million b. \$1.5 million
c. \$13.3 million d. \$2.2 million

18. Solve $4 + 2\sin x = 14 - 8\sin x$ for $0° \le x \le 180°$.

a. 0° b. 60°
c. 90° d. 45°

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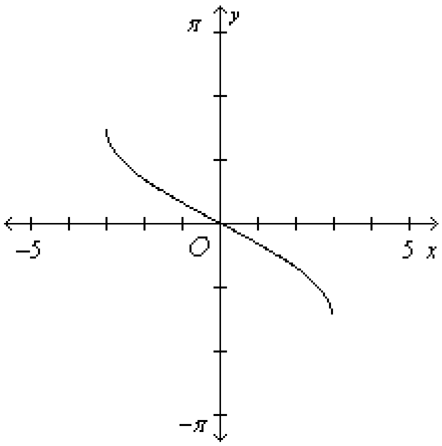
19. State whether the graph of $f(x) = \dfrac{x^3 - 11x^2 + 30x}{x - 6}$ has infinite discontinuity, jump discontinuity, point discontinuity, or is continuous.

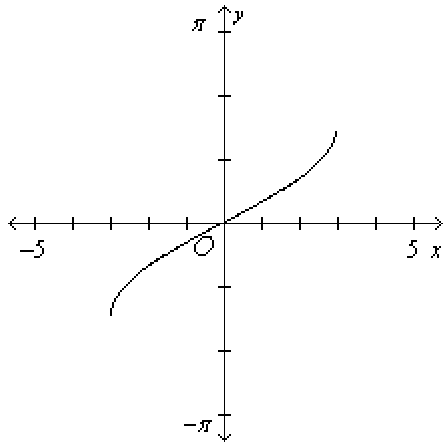
a. The function has point discontinuity.
b. The function has jump discontinuity.
c. The function is continuous.
d. The function has infinite discontinuity.

20. Graph $y = \mathrm{Sin}^{-1}\left(\frac{1}{3}x\right)$ on the interval $-5 \le x \le 5$.

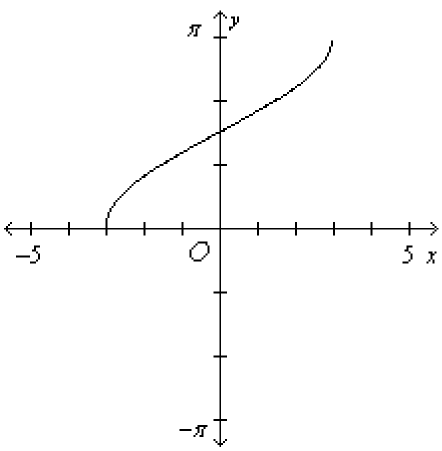
a.



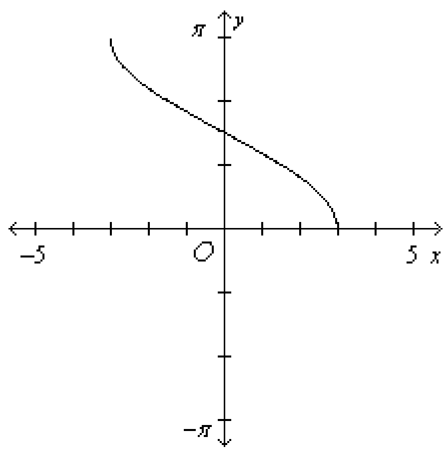
b.



c.



d.



21. Simplify the expression $\dfrac{3 - 9i\sqrt{5}}{3 + 2i\sqrt{5}}$ by using complex conjugates to write quotients of complex numbers in standard form.

a. $-\dfrac{9}{19} + \dfrac{33}{29}i\sqrt{5}$
b. $-\dfrac{81}{29} - \dfrac{33}{29}i\sqrt{5}$
c. $-\dfrac{9}{19} + \dfrac{60}{19}i\sqrt{5}$
d. $-\dfrac{81}{29} - \dfrac{60}{19}i\sqrt{5}$

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22. Simplify $\frac{\cos x}{\csc x + 1}$

a. $\tan x - \tan x \csc x$ b. $\sin x \cos x + \cos x$
c. $\tan x - \tan x \sec x$ d. $\tan x + \tan x \sec x$

23. When rabbits were introduced to the continent of Australia they quickly multiplied and spread across the continent since there were only primitive marsupial competitors and predators to interfere with the exponential growth of their population. The data in the following table can be used to create a model of rabbit population growth.

Time (months)	0	3	6	9	12
No. of Rabbits	6	32	107	309	770

1. Find the regression equation for the rabbit population as a function of time *x*.
2. Write the regression equation in terms of base *e*.
3. Use the equation from part b to estimate the time for the rabbits to exceed 10,000.

a. 1. $y = 7.898 \times (1.491)^x$
2. $y = 7.898e^{0.3992x}$
3. x = 17.9 months

b. 1. $y = 7.982 \times (1.497)^x$
2. $y = 7.982e^{0.4035x}$
3. x = 17.7 months

c. 1. $y = 7.982 \times (1.907)^x$
2. $y = 7.982e^{0.6455x}$
3. x = 20.6 months

d. 1. $y = 7.898 \times (1.049)^x$
2. $y = 7.898e^{0.0478x}$
3. x = 149 months

24. Solve.

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

a. –9 b. –2, 3
c. 5 d. 0

25. Simplify the expression. $\frac{x^{\frac{4}{7}} \bullet x^{\frac{3}{7}}}{x^{\frac{1}{7}}}$

a. $x^{\frac{7}{8}}$ b. $x^{\frac{6}{7}}$
c. $x^{\frac{7}{6}}$ d. $x^{\frac{8}{7}}$

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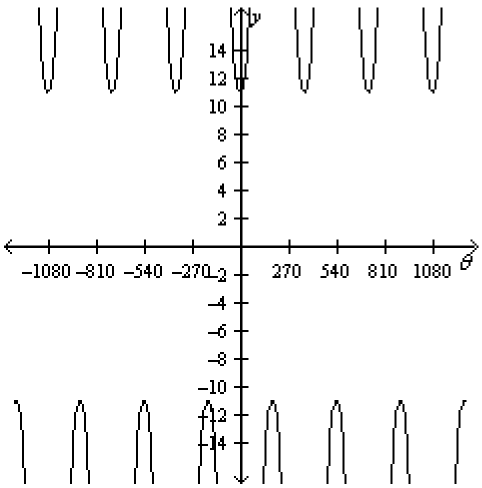
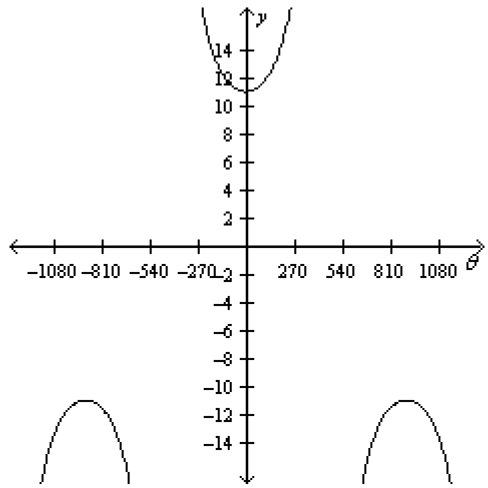
26. Find $\begin{bmatrix} 4 & 5 \\ -3 & -6 \end{bmatrix} + \frac{1}{2}\begin{bmatrix} 0 & 6 \\ -6 & -4 \end{bmatrix}$.

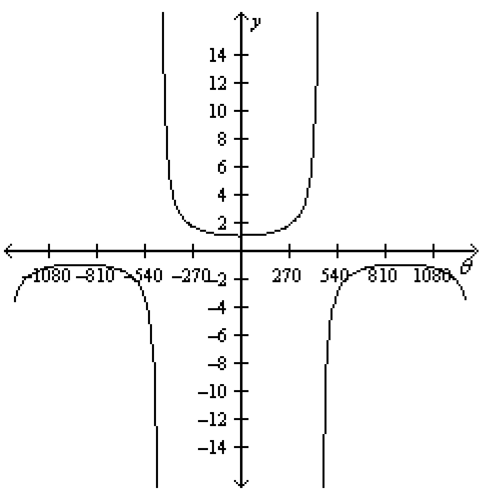
a. $\begin{bmatrix} 2 & 5.5 \\ -4.5 & -5 \end{bmatrix}$ b. $\begin{bmatrix} 4 & 8 \\ -9 & -10 \end{bmatrix}$

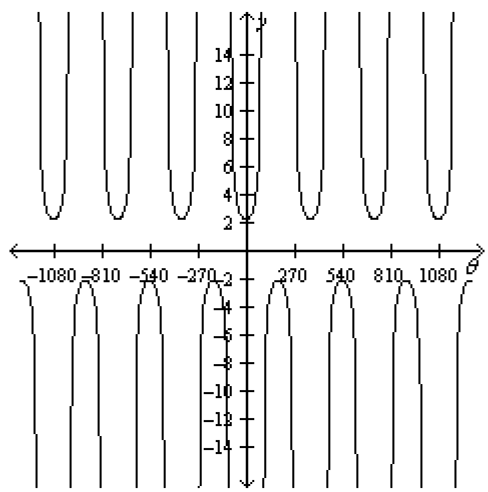
c. $\begin{bmatrix} 4 & 8 \\ -6 & -8 \end{bmatrix}$ d. $\begin{bmatrix} 2 & 8.5 \\ -7.5 & -7 \end{bmatrix}$

27. Graph $y = 11 \sec \frac{1}{5}\theta$.

a.


b.


c.


d.


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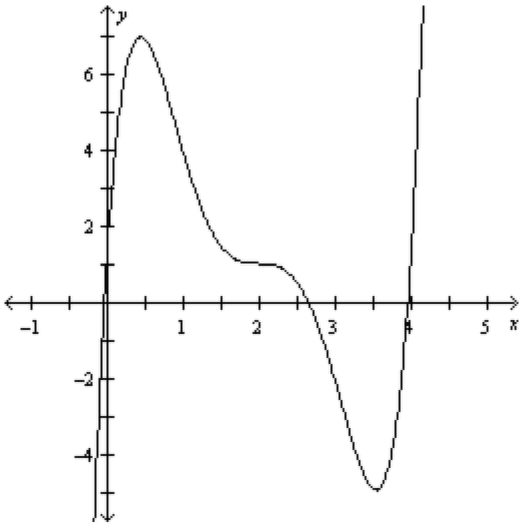
Estimate and classify the critical points for the graph of each function.

28.



a. (0.5, 7), minimum; (2, 1), point of inflection; (3.5, –5), maximum
b. (0.5, 7), maximum; (2, 1), point of inflection; (3.5, –5), minimum
c. (0.5, 7), maximum; (3.5, –5), minimum
d. no critical points

Solve each equation.

29. $32^{x-1} = 16^{x+4}$

a. 24 b. 21
c. –21 d. 11

30. Find the partial fraction decomposition of the rational expression with irreducible quadratic factors, $\dfrac{x^3 - x + 8}{x^4 - 4x^2 + 4}$.

a. $\dfrac{x}{x^2-2} + \dfrac{x+8}{(x^2-2)^2}$ b. $\dfrac{x}{(x^2-2)^2} + \dfrac{x+8}{x^2-2}$
c. $\dfrac{x}{(x^2-2)^2} - \dfrac{x+8}{x^2-2}$ d. $\dfrac{x}{x^2-2} - \dfrac{x+8}{(x^2-2)^2}$

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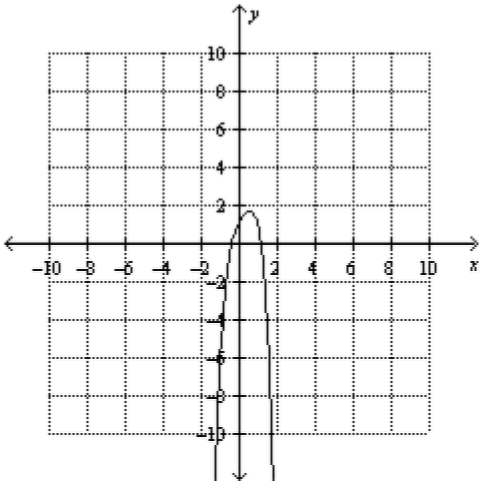
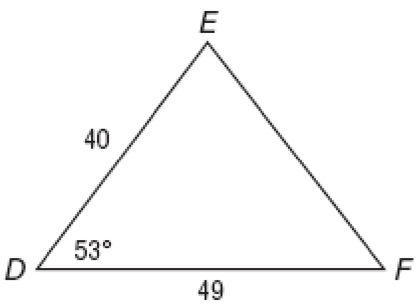
31. Use the graph of $f(x)$ to estimate $f(–1)$.



a. $f(–1) = 7$ b. $f(–1) = –8$
c. $f(–1) = –7$ d. $f(–1) = –6$

Solve each triangle. Round to the nearest tenth if necessary.

32.



a. $E \approx 48.0°$, $F \approx 68.0°$, $d \approx 23.4$
b. $E \approx 52.0°$, $F \approx 75.0°$, $d \approx 40.5$
c. $E \approx 75.0°$, $F \approx 52.0°$, $d \approx 40.5$
d. $E \approx 125.0°$, $F \approx 70.0°$, $d \approx 28.3$

33. Determine whether $A = \begin{bmatrix} 2 & -3 \\ 2 & -2 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -1 \\ -1 & 2 \end{bmatrix}$ are inverse matrices.

a. Yes b. No

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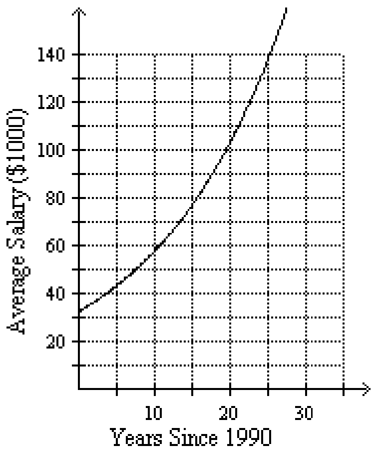
34. The nationwide average salary of a computer programmer can be modeled by the equation $y = 31.8 \times (1.06)^n$, where *y* is the salary in thousands of dollars and *n* is the number of years since 1990.

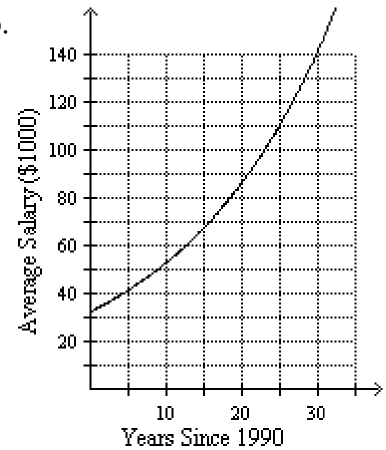
Graph the function. Then, using this model, predict the average programmer's salary in 2010.

a.



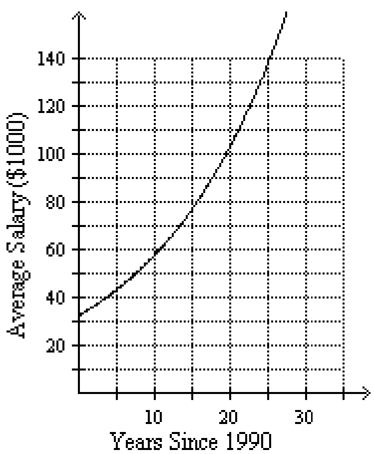
$102,000

b.



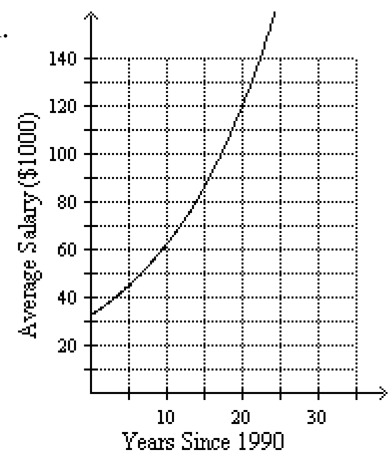
$83,000

c.



$86,000

d.



$121,000

35. Determine between which consecutive integers the real zeros of $f(x) = -4x^3 - 2x^2 + 5x + 7$are located on the interval [–10, 10]. If the zero occurs at an integer, write the integer.

a. $-8 < x < -7$
b. $1 < x < 2;$
c. $0 < x < 1; 2 < x < 3;$
d. $-3 < x < -2; -2 < x < -1; -1 < x < 0; 1 < x < 2;$

==