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Precalculus -G11-Ch.4-6-Quarter 2-Exam

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

1. 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

2. Write the augmented matrix for the system of linear equations.

$9w + 9x + 9y + 7z = -7$
$5x - 6y + 5z = 5$
$3w - 7x + 2y - 7z = 4$

$w - 4x + 9y = 1$

a. $\left[\begin{array}{cccc|c} 9 & 9 & 9 & 7 & -7 \\ 0 & 5 & -6 & 5 & 5 \\ 3 & -7 & 2 & -7 & 4 \\ 1 & -4 & 9 & 0 & 1 \end{array}\right]$

b. $\left[\begin{array}{cccc|c} 3 & -7 & 2 & -7 & 4 \\ 0 & 5 & -6 & 5 & 5 \\ 9 & 9 & 9 & 7 & -7 \\ 0 & 1 & -4 & 9 & 1 \end{array}\right]$

c. $\left[\begin{array}{cccc|c} 9 & 9 & 9 & 7 & -7 \\ 5 & 5 & -6 & 5 & 5 \\ 1 & -4 & 9 & 9 & 1 \\ 3 & -7 & 2 & -7 & 4 \end{array}\right]$

d. $\left[\begin{array}{cccc|c} 3 & -7 & 2 & -7 & 4 \\ 5 & -6 & 5 & 5 & 0 \\ 9 & 9 & 9 & 7 & -7 \\ 1 & -4 & 9 & 1 & 0 \end{array}\right]$

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3. Write the augmented matrix for the system of linear equations.

$8w - x - 8y - 7z = 0$
$-5x + 9y - 6z = 5$
$2w + 7x + 5y - 2z = 6$

$w - 7x + y = 9$

a. $\left[\begin{array}{cccc|c} 8 & -1 & -8 & -7 & 0 \\ -5 & -5 & 9 & -6 & 5 \\ 1 & -7 & 1 & 1 & 9 \\ 2 & 7 & 5 & -2 & 6 \end{array}\right]$

b. $\left[\begin{array}{cccc|c} 2 & 7 & 5 & -2 & 6 \\ -5 & 9 & -6 & 5 & 0 \\ 8 & -1 & -8 & -7 & 0 \\ 1 & -7 & 1 & 9 & 0 \end{array}\right]$

c. $\left[\begin{array}{cccc|c} 2 & 7 & 5 & -2 & 6 \\ 0 & -5 & 9 & -6 & 5 \\ 8 & -1 & -8 & -7 & 0 \\ 0 & 1 & -7 & 1 & 9 \end{array}\right]$

d. $\left[\begin{array}{cccc|c} 8 & -1 & -8 & -7 & 0 \\ 0 & -5 & 9 & -6 & 5 \\ 2 & 7 & 5 & -2 & 6 \\ 1 & -7 & 1 & 0 & 9 \end{array}\right]$

4. Write the augmented matrix for the system of linear equations.

$-5w + 4x + 7y + z = 7$
$7x - 6y - 7z = -5$
$-7w - 5x + 9y - 3z = 9$

$-3w + 2x - 7y = -2$

a. $\left[\begin{array}{cccc|c} -5 & 4 & 7 & 1 & 7 \\ 7 & 7 & -6 & -7 & -5 \\ -3 & 2 & -7 & -7 & -2 \\ -7 & -5 & 9 & -3 & 9 \end{array}\right]$

b. $\left[\begin{array}{cccc|c} -7 & -5 & 9 & -3 & 9 \\ 0 & 7 & -6 & -7 & -5 \\ -5 & 4 & 7 & 1 & 7 \\ 0 & -3 & 2 & -7 & -2 \end{array}\right]$

c. $\left[\begin{array}{cccc|c} -5 & 4 & 7 & 1 & 7 \\ 0 & 7 & -6 & -7 & -5 \\ -7 & -5 & 9 & -3 & 9 \\ -3 & 2 & -7 & 0 & -2 \end{array}\right]$

d. $\left[\begin{array}{cccc|c} -7 & -5 & 9 & -3 & 9 \\ 7 & -6 & -7 & -5 & 0 \\ -5 & 4 & 7 & 1 & 7 \\ -3 & 2 & -7 & -2 & 0 \end{array}\right]$

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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.

5. $f(x, y) = 2x + 6y$
$x \geq 0$
$y \geq 0$
$2x + 7y \leq 70$
$8x + 4y \leq 136$

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

6. Choose the phrase that best describes the matrix.

$$\left[\begin{array}{ccc|c} 1 & -4 & 3 & 5 \\ 1 & 1 & 9 & -8 \\ 0 & 0 & 1 & 9 \end{array}\right]$$

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

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.

7. $f(x, y) = 3x + 7y$
$x \geq 0$
$y \geq 0$
$4x + 8y \leq 48$
$6x + 3y \leq 36$

a. max at (4, 4) = 40, min at (0, 0) = 0
b. max at (0, 6) = 42, min at (0, 0) = 0
c. max at (6, 0) = 18, min at (0, 0) = 0
d. max at (5, 7) = 64, min at (0, 0) = 0

8. $f(x, y) = 2x + 6y$
$y \leq -2x - 5$
$y \leqq 6x - 13$
$y \geq -2x + 43$

a. min at $(1, -7) = -40$, max at $(7, 29) = 188$
b. max at $(7, 29) = 188$, no min
c. max at $(1, -7) = -40$, no min
d. min at $(1, -7) = -40$, no max

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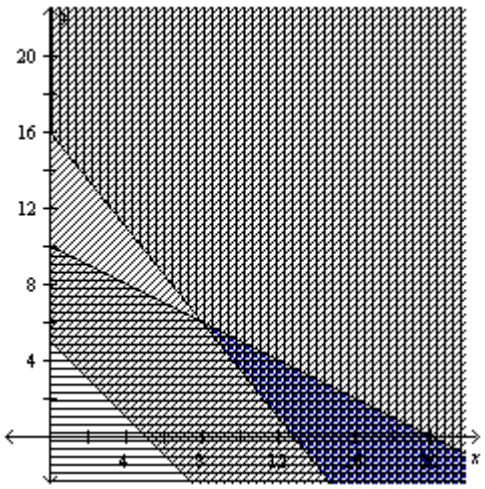
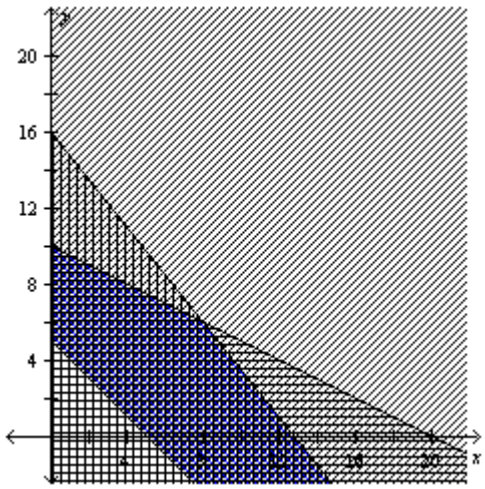
9. Graph the region corresponding to the solution of the system of constraints.

$f(x, y) = 3y + x$
$x \geq 0$
$y \geq -2$
$6x + 12y \leq 120$
$10x + 8y \leq 128$
$2x + 2y \geq 10$

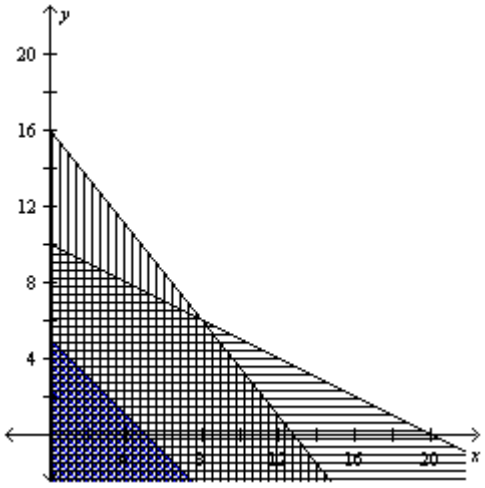
a.



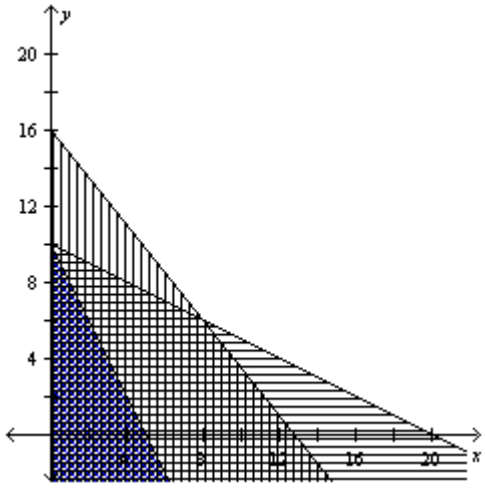
b.



c.



d.



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10. If $\cos x = \frac{\sqrt{3}}{2}$, find $\cos(x + \pi)$.

a. $\frac{-\sqrt{3} - 1}{2}$

b. $-\frac{\sqrt{3}}{2}$

c. $-\frac{1}{2}$

d. $\frac{\sqrt{3}}{2}$

11. 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

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

$-6x + 5y + 4z = 0$
$5x + 7y + 4z = -74$
$4x + 2y - 4z = -16$

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

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.

13. $f(x, y) = 3x + 3y$
$y \leq -4x - 6$
$y \leq 6x - 6$
$y \geq -4x + 54$

a. min at $(0, -6) = -18$,
max at $(6, 30) = 108$

b. min at $(0, -6) = -18$, no max

c. max at $(6, 30) = 108$, no min

d. max at $(0, -6) = -18$, no min

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14. Write the system of equations in triangular form using Gaussian elimination. Then solve the system.

$3x + 9y - 18z = -207$
$-3x + y + 5z = 50$
$2x - 6y - 6z = -36$

a. $x = -6, y = -6, z = 7$ b. $x = -3, y = -4, z = 9$
c. $x = -4, y = -3, z = 11$ d. $x = -24, y = -5, z = 5$

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.

15. $f(x, y) = 2x + 6y$
$y \leq -5x - 4$
$y \leq 4x - 4$
$y \geq -5x + 59$

a. max at $(7, 24) = 158$, no min b. min at $(0, -4) = -24$, no max
c. min at $(0, -4) = -24$, max at $(7, 24) = 158$ d. max at $(0, -4) = -24$, no min

16. Find the inverse of $R = \begin{bmatrix} 0 & 0 \\ 4 & 3 \end{bmatrix}$, if it exists.

a. $\begin{bmatrix} 0 & 0 \\ 3 & 4 \end{bmatrix}$ b. $\begin{bmatrix} 0 & 0 \\ \frac{1}{4} & \frac{1}{3} \end{bmatrix}$
c. $\begin{bmatrix} 4 & 3 \\ 0 & 0 \end{bmatrix}$ d. R^{-1} does not exist.

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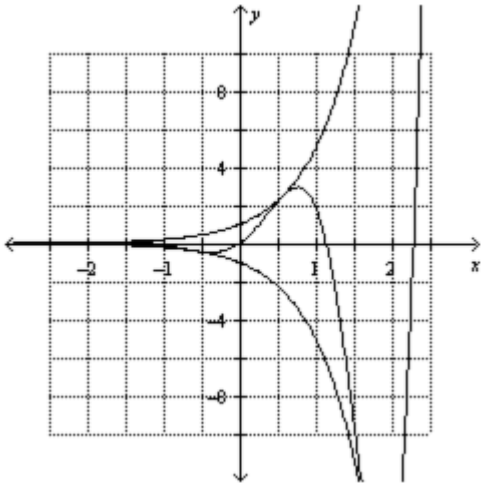
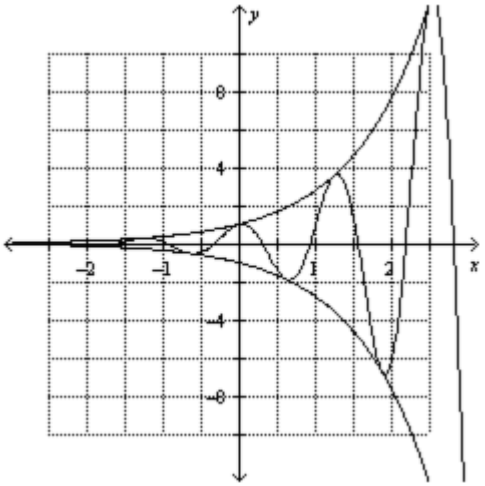
Graph *f*(*x*), –*f*(*x*), and the given function.

17. $y = 2.75^x \sin 5x$

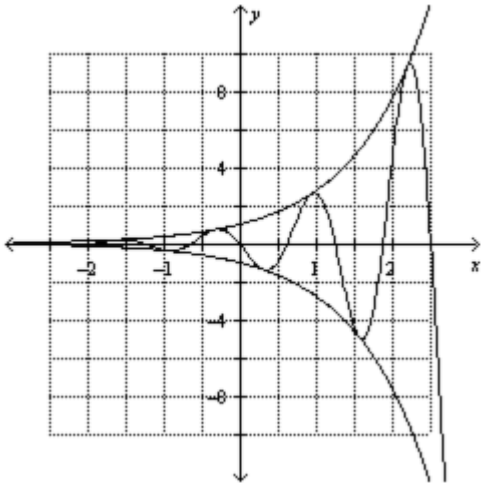
a.



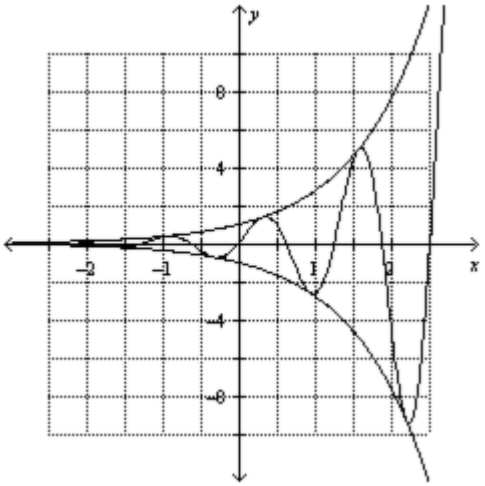
b.



c.



d.



18. Solve $6 + 4\sin x = 6 - 8\sin x$ for $0° \le x \le 180°$.

a. 90° b. 180° or 0°
c. 135° d. 30°

19. $\sin x \cot x - 2\sin x = 0$

a. $\frac{\pi}{2} + n\pi, \frac{\pi}{4} + 2n\pi$ b. $0 + n\pi, \frac{5\pi}{4} + 2n\pi$

c. $\frac{\pi}{2} + n\pi, \frac{5\pi}{4} + 2n\pi$ d. $0 + n\pi, \frac{\pi}{4} + 2n\pi$

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Use Heron's Formula to find the area of each triangle. Round to the nearest tenth.

20. $\triangle FGH$ if f = 11 in., g = 13 in., h = 16 in.

a. 20.0 in^2

b. 71.0 in^2

c. 5040.0 in^2

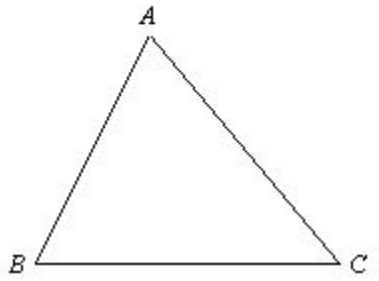
d. 2520.0 in^2

21. Solve $\sin\frac{x}{2} = \cos x$ on the interval [0, 2π).

a. $\frac{\pi}{3}, \frac{5\pi}{3}$ b. $\pi, \frac{\pi}{6}, \frac{11\pi}{6}$

c. $\pi, \frac{\pi}{3}, \frac{5\pi}{3}$ d. $\frac{\sqrt{2}}{2}$

22. Determine whether $\triangle ABC$ should be solved by using the Law of Sines or the Law of Cosines. Then solve the triangle.



a = 18, b = 22, C = 30°

a. Law of Sines; $c \approx 38.7$, $A \approx 13.4°$, $B \approx 136.6°$

b. Law of Cosines; $c \approx 38.7$, $A \approx 13.4°$, $B \approx 136.6°$

c. Law of Sines; $c \approx 11.1$, $A \approx 95.8°$, $B \approx 54.2°$

d. Law of Cosines; $c \approx 11.1$, $A \approx 54.2°$, $B \approx 95.8°$

23. Find the exact value of $\frac{\tan 106 + \tan(-61)}{1 - \tan 106 \tan(-61)}$.

a. −1 b. 1

c. no solution d. 0

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24. Which of the following are the solutions of $\tan(\pi + x) + \tan(\pi + x) = 2$ on the interval $[0, 2\pi)$?

a. $\frac{\pi}{2}, \frac{3\pi}{2}$ b. $\frac{3\pi}{4}, \frac{7\pi}{4}$

c. $0, \pi$ d. $\frac{\pi}{4}, \frac{5\pi}{4}$

25. **KITE FLYING** Brett and Tara are flying a kite. When the string is tied to the ground, the height of the kite can be determined by the formula $\frac{L}{H} = \csc\theta$, where L is the length of the string and θ is the angle between the string and the level ground. What formula could Brett and Tara use to find the height of the kite if they know the value of $\sin\theta$.

a. $H = L \sin\theta$

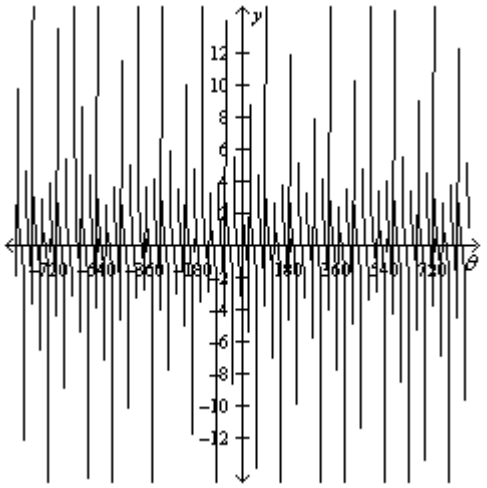
b. $H = L \csc\theta$

c. $H = L \cos\theta$

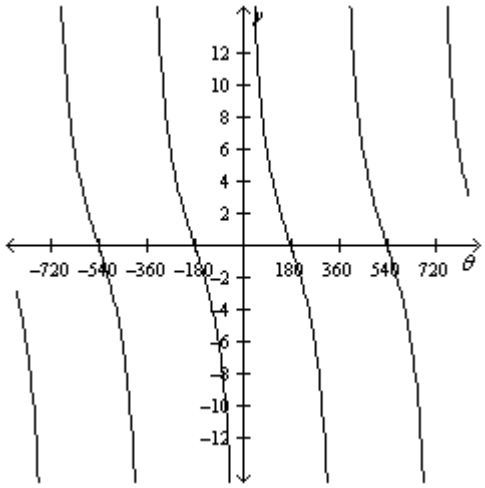
d. $L = H \sin\theta$

26. Graph $y = 6 \cot\frac{1}{2}\theta$.

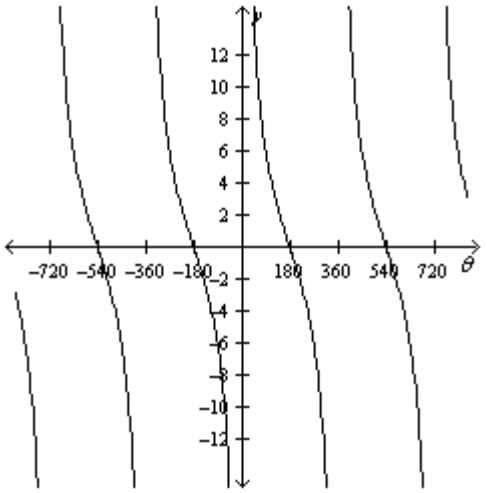
a.



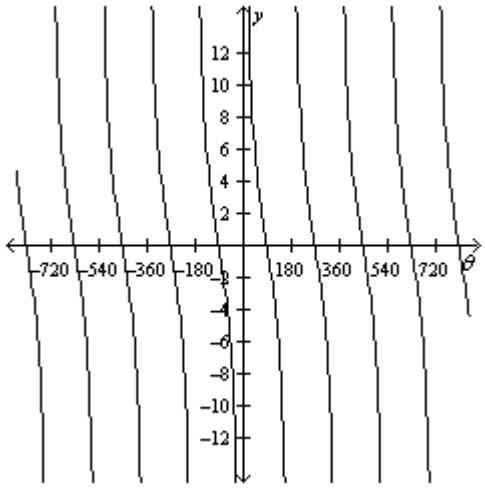
b.



c.



d.



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27. If $A = \begin{bmatrix} 2 & 8 & 4 \\ -3 & 5 & -2 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 8 \\ 1 & 5 \end{bmatrix}$, find AB.

a. $\begin{bmatrix} 4 & 64 & -3 \\ -3 & 25 & -2 \end{bmatrix}$

b. $\begin{bmatrix} 12 & 56 \\ -1 & 1 \end{bmatrix}$

c. $\begin{bmatrix} 16 & 60 \\ -3 & -1 \end{bmatrix}$

d. Not possible

28. Find the exact value of $\tan 105°$.

a. $-2 - \sqrt{3}$

b. $-2 + \sqrt{3}$

c. $\dfrac{\sqrt{6}}{4}$

d. $\dfrac{\sqrt{2}}{2}$

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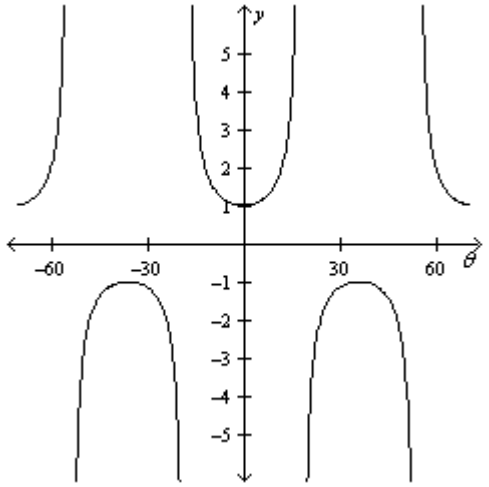
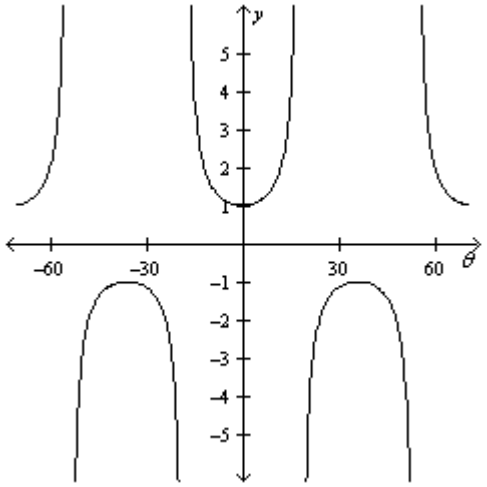
29. Graph $y = \sec 5\theta$.

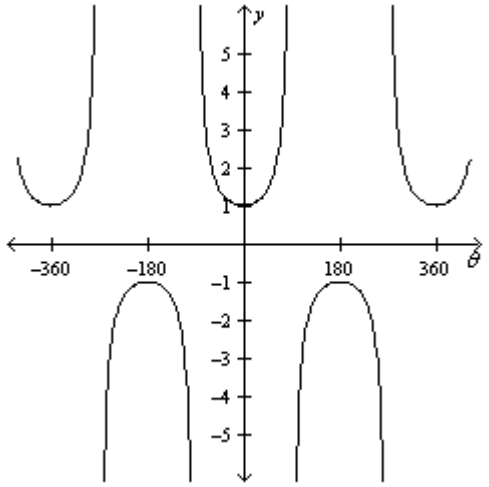
a.



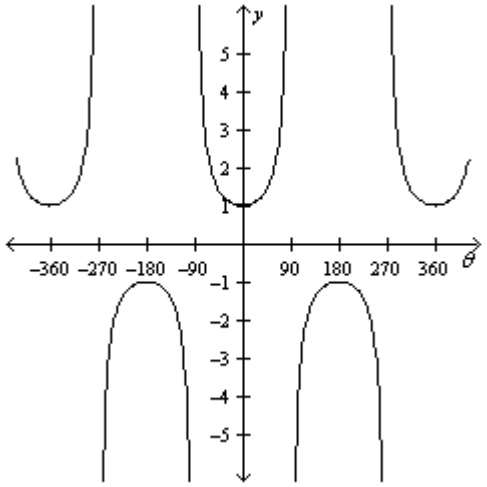
b.



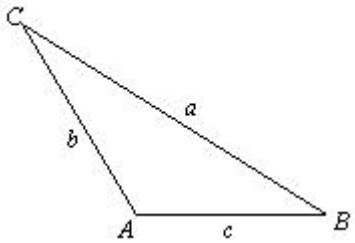
c.



d.



30. Determine whether ΔABC has *no solution* or *one solution.* Then solve the triangle if possible.



$A = 120°$, $a = 7$, $b = 4$

a. one solution; $c \approx 4.1$; $B \approx 29.7°$; $C \approx 30.3°$
b. one solution; $c \approx 4.1$; $B \approx 30.3°$; $C \approx 29.7°$
c. one solution; $c \approx 7$; $B \approx 29.7°$; $C \approx 120°$
d. no solution

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