Name:_____ Class:_____ Date:_____

Precalculus-G11-Ch.4-6-Q.2 _Exam

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

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

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.

2. $f(x, y) = 6x + 2y$
$y \leq -3x - 1$
$y \leq 4x - 8$
$y \geq -3x + 20$

a. min at $(1, -4) = -2$, max at $(4, 8) = 40$

b. min at $(1, -4) = -2$, no max

c. max at $(1, -4) = -2$, no min

d. max at $(4, 8) = 40$, no min

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. Solve the system of equations.

$-3x + 3y - 9z + 42w = -42$
$-6x + 3y - 18z + 96w = -54$
$x - y + 2z - 10w = 11$

a. $(-8 - w, -7 + 10w, -2 - 10w, w)$

b. $(4 + 4w, 4 + 4w, 3 - 2w, w)$

c. $(4, -133, 1, 9)$

d. $(-5 + 6w, -10 + 4w, 3 + 4w, w)$

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Precalculus-G11-Ch.4-6-Q.2 _Exam

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

$-9w + x + 8y + 2z = -6$
$-5x + 9y - 7z = 6$
$-3w - 6x + 4y + 9z = 4$

$-3w - 8x + y = -2$

a. $\left[\begin{array}{cccc|c} -9 & 1 & 8 & 2 & -6 \\ 0 & -5 & 9 & -7 & 6 \\ -3 & -6 & 4 & 9 & 4 \\ -3 & -8 & 1 & 0 & -2 \end{array}\right]$

b. $\left[\begin{array}{cccc|c} -3 & -6 & 4 & 9 & 4 \\ 0 & -5 & 9 & -7 & 6 \\ -9 & 1 & 8 & 2 & -6 \\ 0 & -3 & -8 & 1 & -2 \end{array}\right]$

c. $\left[\begin{array}{cccc|c} -9 & 1 & 8 & 2 & -6 \\ -5 & -5 & 9 & -7 & 6 \\ -3 & -8 & 1 & 1 & -2 \\ -3 & -6 & 4 & 9 & 4 \end{array}\right]$

d. $\left[\begin{array}{cccc|c} -3 & -6 & 4 & 9 & 4 \\ -5 & 9 & -7 & 6 & 0 \\ -9 & 1 & 8 & 2 & -6 \\ -3 & -8 & 1 & -2 & 0 \end{array}\right]$

6. If $x = \frac{\pi}{6}$, find $\sin(x + \pi)$.

a. 1
b. 0
c. $-\frac{1}{2}$
d. –1

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

$2x - 2y + 4z = 4$
$-5x + 4y + 3z = -2$
$-x - 7y + 6z = -34$

a. $(10, -5, 1)$ b. $(10, -8, -8)$
c. $(5, 5, 1)$ d. no solution

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

$3x + 4y + 5z = 31$
$4x - 4y - z = -53$
$-5x + 12y + 7z = 137$

a. (7, –10, –1) b. (–6, 6, 5)
c. (–6, –10, 0) d. no unique solution

Precalculus-G11-Ch.4-6-Q.2 _Exam

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

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.

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

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 $(0, 0) = 0$

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Precalculus-G11-Ch.4-6-Q.2 _Exam

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

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

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

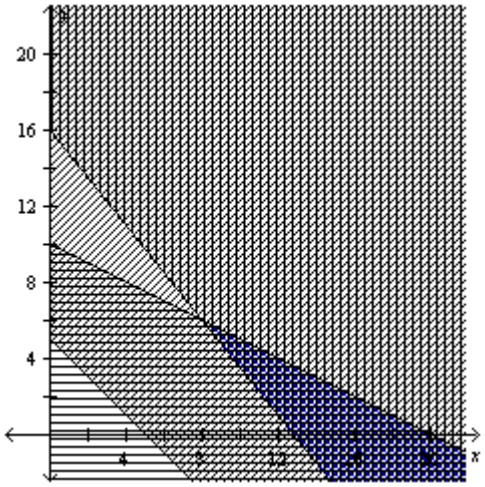
a. (4, –6, 6)
b. (6, 5, –2)
c. (4, –3, –2)
d. no unique solution

Precalculus-G11-Ch.4-6-Q.2 _Exam

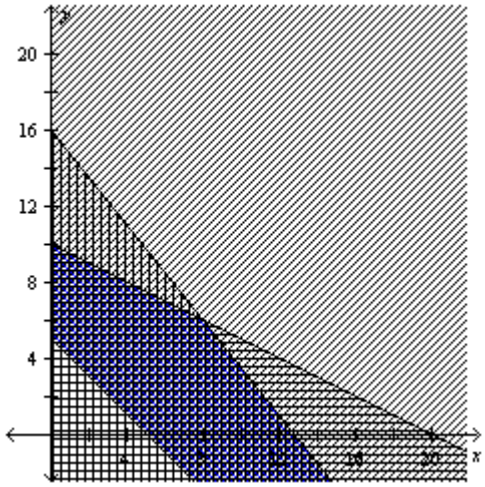
13. Graph the region corresponding to the solution of the system of constraints.

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

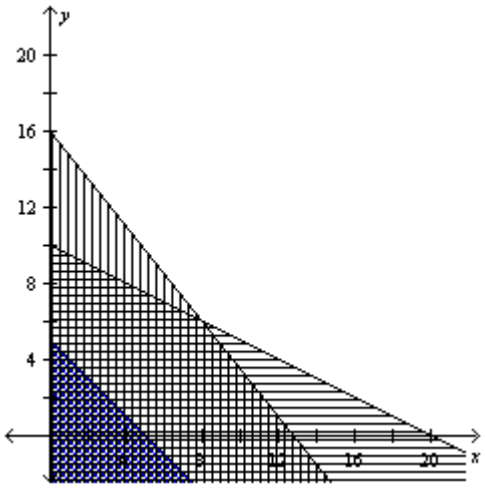
a.



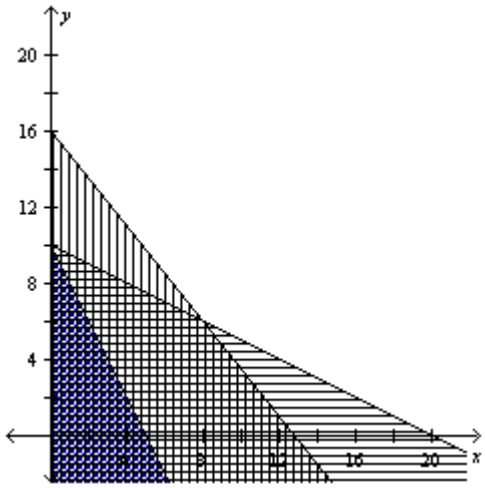
b.



c.



d.



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.

14. $f(x, y) = x + 7y$
$x \geq 0$
$y \geq 0$
$3x + 9y \leq 99$
$9x + 2y \leq 72$

a. max at (7, 12) = 91, min at (0, 0) = 0
b. max at $(8, 0) = 8$, min at $(0, 0) = 0$
c. max at $(6, 9) = 69$, min at $(0, 0) = 0$
d. max at $(0, 11) = 77$, min at $(0, 0) = 0$

Precalculus-G11-Ch.4-6-Q.2 _Exam

15. $f(x, y) = x + 10y$
$x \geq 0$
$y \geq 0$
$3x + 6y \leq 84$
$9x + 3y \leq 72$

a. max at $(0, 14) = 140$, min at $(0, 0) = 0$
b. max at (5, 15) = 155, min at (0, 0) = 0
c. max at $(8, 0) = 8$, min at $(0, 0) = 0$
d. max at $(4, 12) = 124$, min at $(0, 0) = 0$

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

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.

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

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

Precalculus-G11-Ch.4-6-Q.2 _Exam

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

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

19. $f(x, y) = 4x + 6y$
$y \leq -4x - 4$
$y \leqslant 2x - 10$
$y \geq -4x + 20$

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

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

$x + 5y - 3z = -10$
$-5x + 6y - 5z = -21$
$-x + 8y - 8z = -25$

a. $(1, -1, 2)$
b. $(-6, -5, 2)$
c. $(-6, -2, -2)$
d. no solution

21. Solve the matrix equation by using inverse matrices.

$$\begin{bmatrix} 5 & 4 \\ -1 & 4 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 16 \\ 40 \end{bmatrix}$$

a. $(-4, 9)$
b. $(\frac{52}{5}, 9)$
c. $(\frac{16}{9}, \frac{40}{3})$
d. $(4, -9)$

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Precalculus-G11-Ch.4-6-Q.2 _Exam

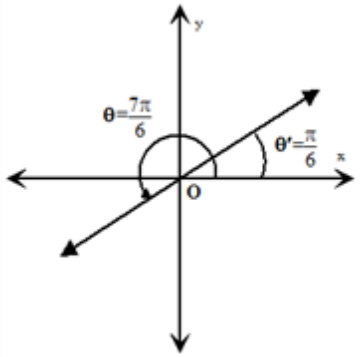
22. Find the determinant of $C = \begin{bmatrix} 2 & -1 \\ -3 & -4 \end{bmatrix}$.

a. –10 b. –14
c. –11 d. 11

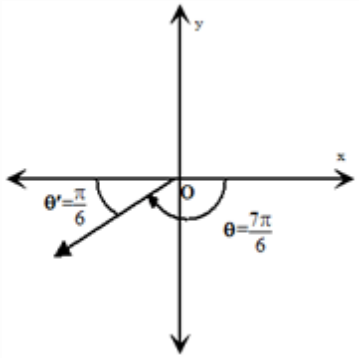
Sketch mentioned angle. Then find its reference angle.

23. $\frac{7\pi}{6}$

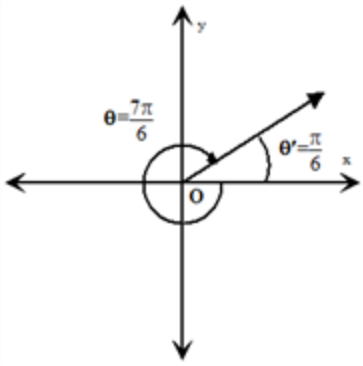
a. $\frac{\pi}{6}$



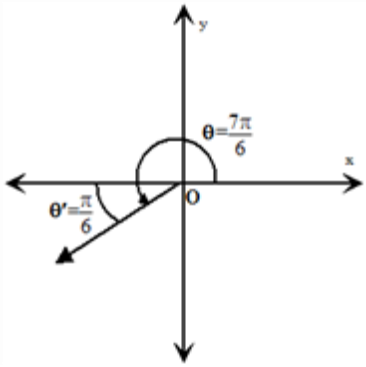
b. $\frac{\pi}{6}$



c. $\frac{\pi}{6}$



d. $\frac{\pi}{6}$



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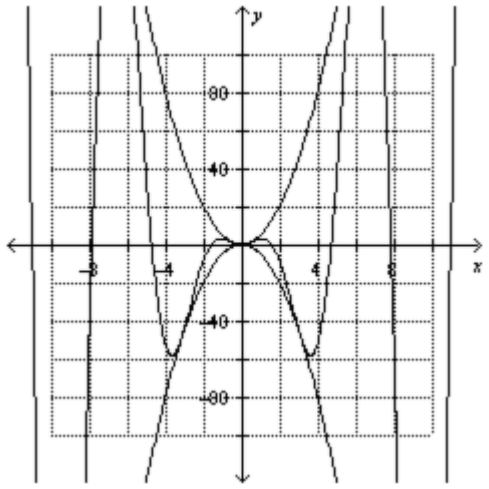
Precalculus-G11-Ch.4-6-Q.2 _Exam

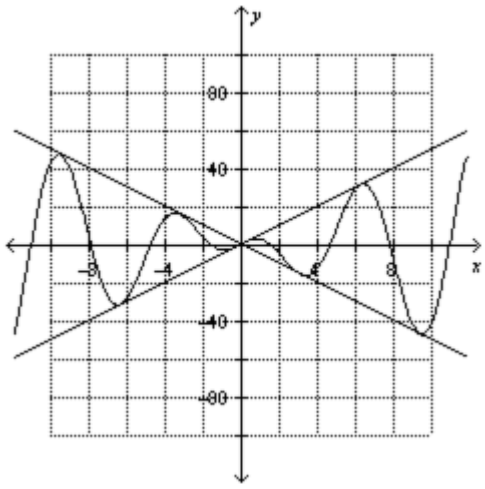
Graph *f*(*x*), –*f*(*x*), and the given function.

24. $y = 5x^2 \cos x$

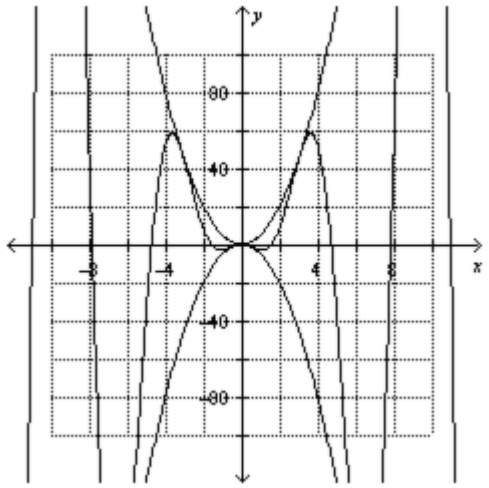
a.



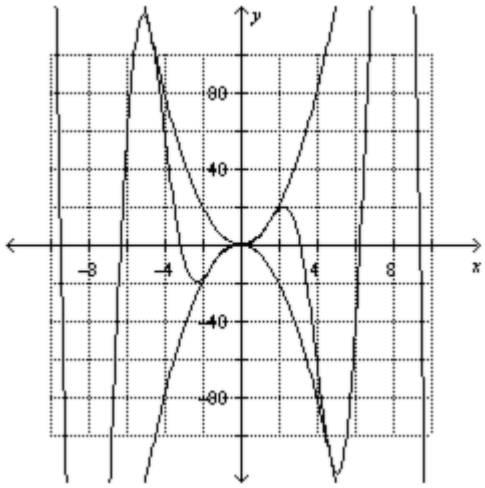
b.



c.



d.



Find all solutions of each equation on the interval [0, 360).

25. $\tan x + 1 = \sec x$

a. π b. $\frac{3\pi}{2}$

c. $0, \pi$ d. $\frac{\pi}{2}, \frac{3\pi}{2}$

26. Simplify $\frac{\tan^2 x - 1}{1 - \sec^2 x}$.

a. $\cot^2 x + 1$ b. $\cot^2 x - 1$

c. $1 - \cot^2 x$ d. cannot be simplified

Precalculus-G11-Ch.4-6-Q.2 _Exam

27. Which of the following are the solutions of $\cot^2 x + 2\csc x = -2$ on the interval [0, 2π)?

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

c. $\frac{\pi}{2}$ d. $\frac{3\pi}{2}$

Find the area of each triangle to the nearest tenth.

28. $\triangle RST$ if $R = 115°$, $s = 15$ yd, $t = 20$ yd

a. 141.8 yd^2

b. 283.6 yd^2

c. –48.9 yd^2

d. 135.9 yd^2

29. Find the exact value of $\cos 15°$.

a. $\frac{\sqrt{6}+\sqrt{2}}{4}$

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

c. $\frac{\sqrt{6}-\sqrt{2}}{4}$

d. $\frac{\sqrt{6}}{4}$

30. Find the exact value of $\cos\frac{11\pi}{6}$.

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

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

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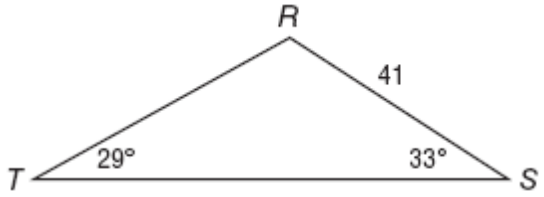
Precalculus-G11-Ch.4-6-Q.2 _Exam

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

31.



a. $R = 118°$, $r \approx 74.7$, $s \approx 46.1$
b. $R = 103°$, $r \approx 33.4$, $s \approx 67.2$
c. $R = 118°$, $r \approx 46.1$, $s \approx 74.7$
d. $R = 47°$, $r \approx 74.7$, $s \approx 46.1$

32. Solve $2\tan\frac{x}{2} + 2\tan\frac{x}{2} = \sqrt{2}$ on the interval $[0, 2\pi)$.

a. $\frac{\pi}{4}, \frac{3\pi}{4}$ b. $\frac{\sqrt{2}}{2}$
c. $\frac{\pi}{6}, \frac{5\pi}{6}$ d. $\frac{\sqrt{2}}{4}$

33. What basic trigonometric identity would you use to verify that $\sin x \cos x \tan x = 1 - \cos^2 x$?

a. $\tan x = \frac{\sin x}{\cos x}$ b. $\cos^2 x + \sin^2 x = 1$
c. $\sin x = \cos x \tan x$ d. $1 + \tan^2 x = \sec^2 x$

34. Find the inverse of $R = \begin{bmatrix} 0 & 0 \\ -5 & 2 \end{bmatrix}$, if it exists.

a. $\begin{bmatrix} 0 & 0 \\ -\frac{1}{5} & \frac{1}{2} \end{bmatrix}$ b. $\begin{bmatrix} 0 & 0 \\ 2 & -5 \end{bmatrix}$
c. $\begin{bmatrix} -5 & 2 \\ 0 & 0 \end{bmatrix}$ d. R^{-1} does not exist.

Precalculus-G11-Ch.4-6-Q.2 _Exam

35. Find the exact value of $\sin\frac{5\pi}{12} + \sin\frac{\pi}{12}$.

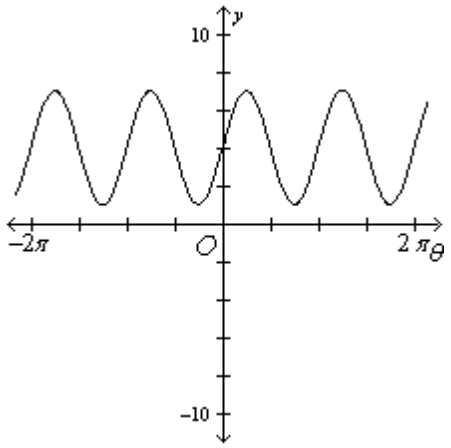
a. $-\frac{\sqrt{2}}{2}$ b. $-\frac{\sqrt{6}}{2}$

c. $\frac{\sqrt{2}}{2}$ d. $\frac{\sqrt{6}}{2}$

36. Graph the function. Which choice gives the amplitude, period, phase shift, and vertical shift for the function?

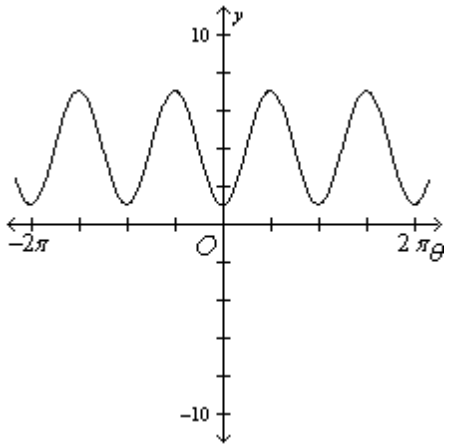
$y = 3\sin\left(2\theta + \frac{3}{2}\pi\right) + 4$

a.



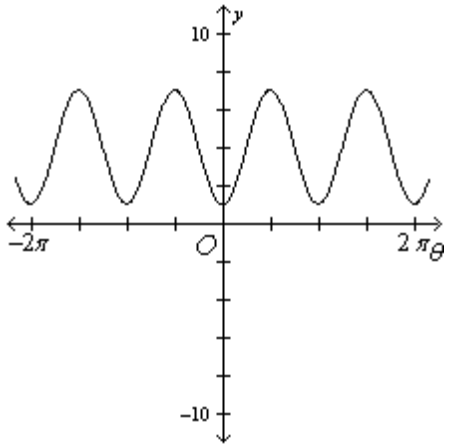
3; π; $-\frac{3}{4}\pi$; 4

b.



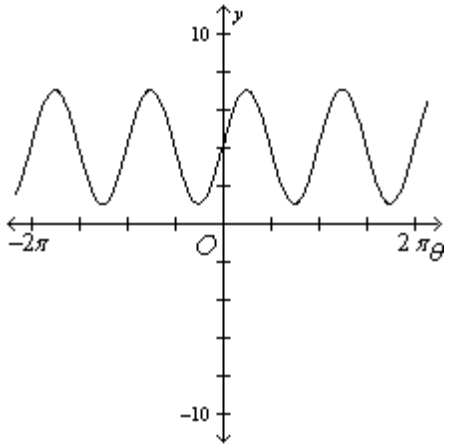
−3; π; $-\frac{3}{4}\pi$; –4

c.



3; π; $-\frac{3}{4}\pi$; 4

d.



−3; π; $-\frac{3}{4}\pi$; 4

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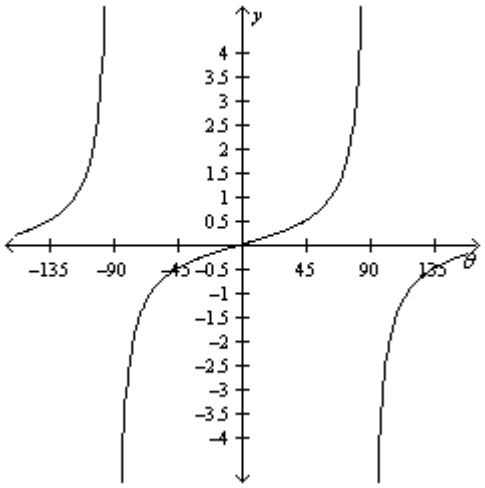
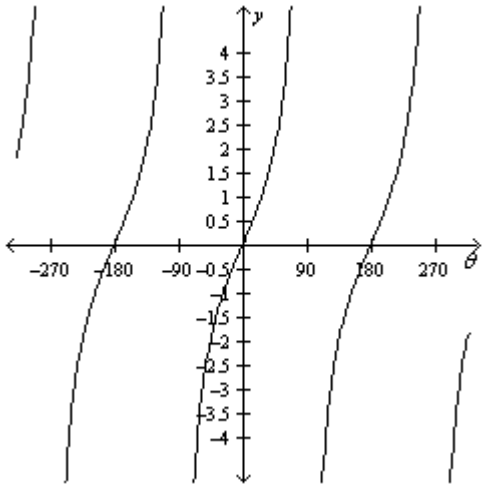
Precalculus-G11-Ch.4-6-Q.2 _Exam

37. Graph $y = \frac{1}{2}\tan\theta$.

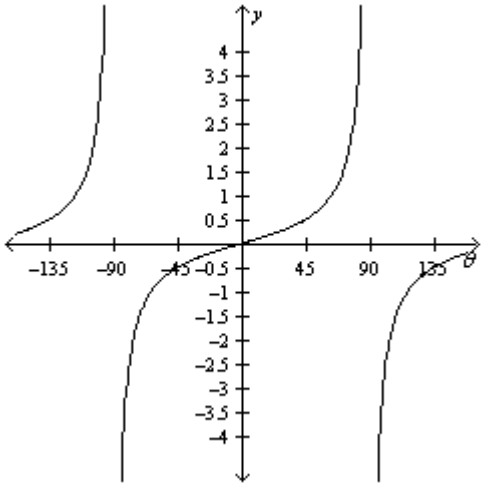
a.



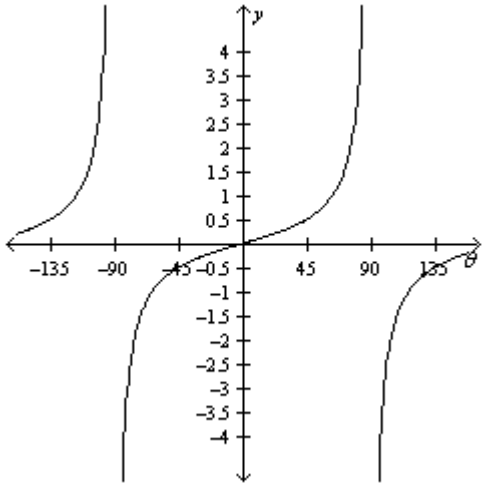
b.



c.



d.



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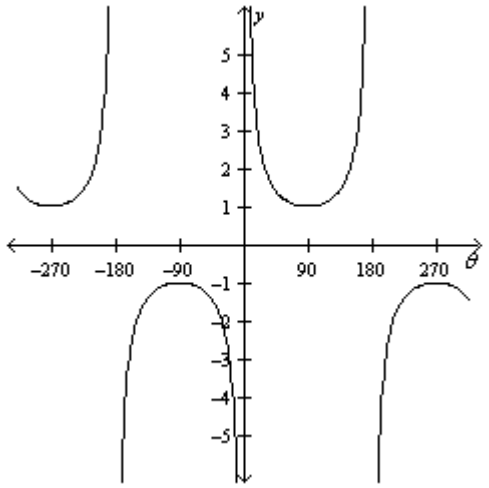
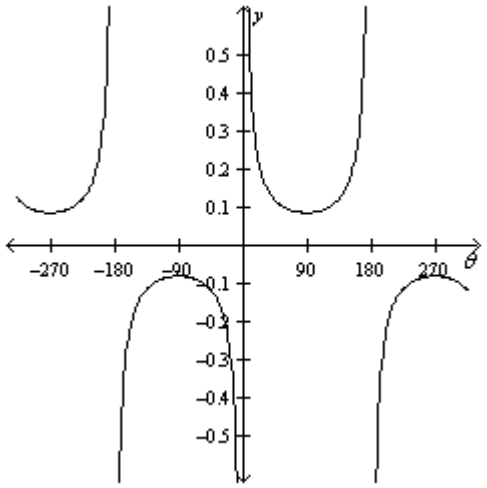
Precalculus-G11-Ch.4-6-Q.2 _Exam

38. Graph $y = \frac{1}{12}\csc\theta$.

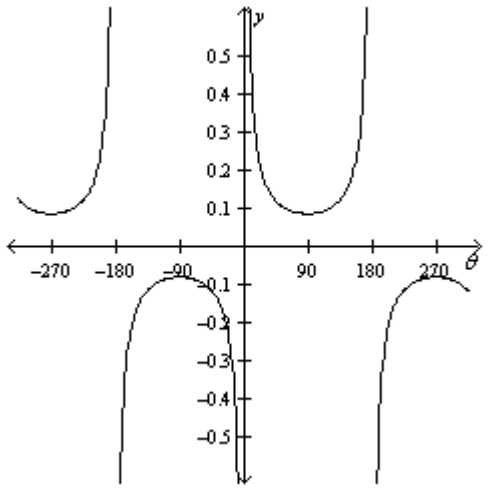
a.



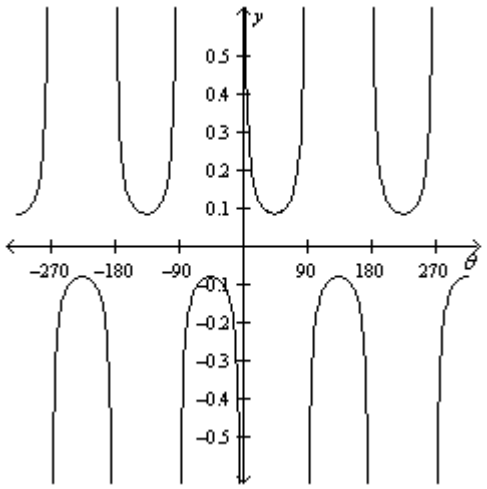
b.



c.



d.



39. For a circle of radius 3 feet, find the arc length *s* subtended by a central angle of 21°.

a. $s = \frac{7}{40}\pi$ feet

b. $s = \frac{7}{20}\pi$ feet

c. $s = \frac{7}{5}\pi$ feet

d. $s = \frac{7}{10}\pi$ feet

40. Find the value of $\cot\left(\cos^{-1}\left(\frac{1}{2}\right)\right)$.

a. $\frac{\sqrt{3}}{3}$

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

c. $-\sqrt{3}$

d. $\sqrt{3}$

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Precalculus-G11-Ch.4-6-Q.2 _Exam

41. If cos $\theta = 0.5$, find $\csc\left(\theta - \frac{\pi}{2}\right)$.

a. 2 b. –2
c. –0.5 d. 0.5

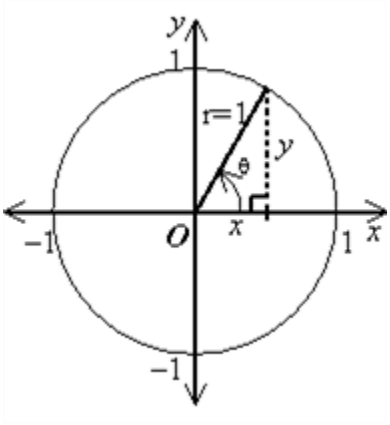
42. Find the area of the triangle with $a = 12.9$, $b = 12.4$, and $c = 17.1$. Round to the nearest tenth.

a. 80.1 units^2 b. 79.1 units^2
c. 79.7 units^2 d. 82.7 units^2

43. Simplify $\frac{\sin^2 x - 1}{1 - \sin^2 x}$.

a. $\tan^2 x + \sec^2 x$ b. $\tan^2 x - \sec^2 x$
c. $\sec^2 x - \tan^2 x$ d. cannot be simplified

44. Use the unit circle to find the value of cot (–90°).



a. cot (–90°) = –1 b. cot (–90°) = 0
c. cot (–90°) = 1 d. undefined

45. Which of the following are the solutions of $\tan^2 x + 2 = 2\sec x$ on the interval [0, 2π)?

a. $\frac{\pi}{2}, \frac{3\pi}{2}$ b. $0, \pi$
c. π d. 0

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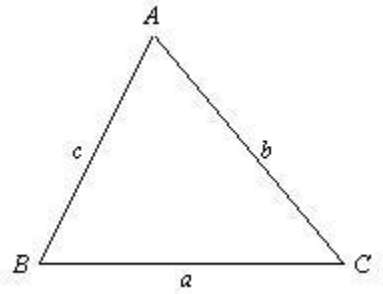
46. Determine whether ΔABC should be solved by using the Law of Sines or the Law of Cosines. Then solve the triangle.



$a = 8$, $b = 6$, $c = 11$

a. Law of Sines; $A \approx 102.6°$, $B \approx 32.2°$, $C \approx 45.2°$
b. Law of Cosines; $A \approx 32.2°$, $B \approx 45.2°$, $C \approx 102.6°$
c. Law of Cosines; $A \approx 45.2°$, $B \approx 32.2°$, $C \approx 102.6°$
d. Law of Sines; $A \approx 45.2°$, $B \approx 32.2°$, $C \approx 102.6°$

47. If $\sin\theta = \frac{4}{5}$ and θ terminates on the interval $\left[0, \frac{\pi}{2}\right]$, find the exact value of $\sin 2\theta$.

a. $\frac{8}{5}$
b. $\frac{25}{24}$
c. $\frac{24}{25}$
d. $\frac{-7}{25}$

48. Suppose θ is an angle in the standard position whose terminal side is in Quadrant IV and $\cot\theta = -\frac{7}{21}$. Find the exact values of the five remaining trigonometric functions of θ.

a. $\sin\theta = -\frac{7}{\sqrt{490}}, \cos\theta = \frac{21}{\sqrt{490}}, \csc\theta = -\frac{\sqrt{490}}{7}, \sec\theta = \frac{\sqrt{490}}{21}, \tan\theta = -\frac{21}{7}$
b. $\sin\theta = -\frac{21}{\sqrt{490}}, \cos\theta = \frac{7}{\sqrt{490}}, \csc\theta = -\frac{\sqrt{490}}{7}, \sec\theta = \frac{\sqrt{490}}{21}, \tan\theta = -\frac{21}{7}$
c. $\sin\theta = -\frac{21}{\sqrt{490}}, \cos\theta = \frac{7}{\sqrt{490}}, \csc\theta = -\frac{\sqrt{490}}{21}, \sec\theta = \frac{\sqrt{490}}{7}, \tan\theta = -\frac{21}{7}$
d. $\sin\theta = \frac{\sqrt{490}}{21}, \cos\theta = -\frac{\sqrt{490}}{7}, \csc\theta = \frac{21}{\sqrt{490}}, \sec\theta = -\frac{7}{\sqrt{490}}, \tan\theta = -\frac{7}{21}$

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49. If $A = \begin{bmatrix} 3 & 9 & 5 \\ -1 & 4 & -2 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 8 \\ 2 & 5 \end{bmatrix}$, find AB.

a. $\begin{bmatrix} 26 & 74 \\ 5 & 10 \end{bmatrix}$

b. $\begin{bmatrix} 21 & 69 \\ 7 & 12 \end{bmatrix}$

c. $\begin{bmatrix} 3 & 72 & -1 \\ -2 & 20 & -2 \end{bmatrix}$

d. Not possible

50. Which of the following are the solutions of $\cos\left(\frac{\pi}{6} + x\right) + \sin\left(\frac{\pi}{3} + x\right) = 0$ on the interval $[0, 2\pi)$?

a. $0, \pi$

b. $\frac{\pi}{2}$

c. 0

d. $\frac{\pi}{2}, \frac{3\pi}{2}$

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Precalculus-G11-Ch.4-6-Q.2 _Exam

Answer Key

1. b

2. d

3. a

4. d

5. a

6. c

7. c

8. d

9. a

10. a

11. c

12. b

13. b

14. d

15. a

16. d

17. b

18. a

19. d

20. a

21. a

22. c

23. d

24. a

25. c

Precalculus-G11-Ch.4-6-Q.2 _Exam

26. b

27. d

28. a

29. a

30. c

31. a

32. a

33. a

34. d

35. d

36. c

37. a

38. b

39. b

40. a

41. b

42. c

43. b

44. b

45. d

46. c

47. c

48. c

49. d

50. d