Name: _____ Date: _____

1. Determine the quadrant(s) in which (x, y) is located so that the condition is satisfied.

   $x = 1$ and $y < -5$
   A) quadrant II
   B) quadrant IV
   C) quadrants I and IV
   D) quadrants II and IV
   E) quadrants III and IV

2. Find the distance between the points.

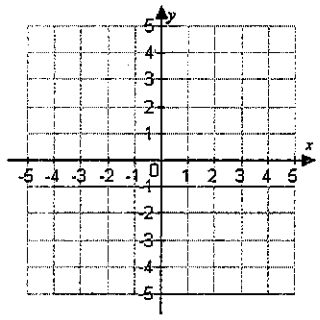
   $(2, -9), (2, 8)$
   A) 17
   B) 1
   C) 4
   D) –4
   E) 0

3. Find the midpoint of the line segment joining the points.

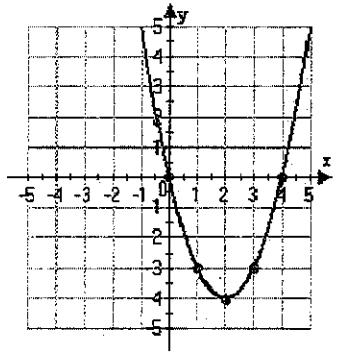
   $(1, 9), (3, 7)$
   A) $(-2, -8)$
   B) $(8, 2)$
   C) $(1, -1)$
   D) $(-1, 1)$
   E) $(2, 8)$

4. Find three ordered pairs satisfying $y = 2x - 5$.
   A) $(3,7), (4,3), (5,5)$
   B) $(3,1), (4,5), (5,5)$
   C) $(3,1), (4,3), (5,5)$
   D) $(4,3), (5,9), (6,7)$
   E) $(4,3), (5,5), (6,11)$

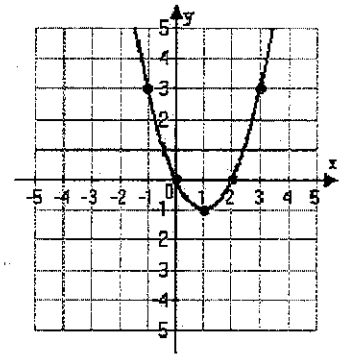
5. Create and complete a table to find the x and y coordinates of points that lie on the graph of the equation $y = x^2 - 4x$. Plot at least 5 points along with the graph of the equation.



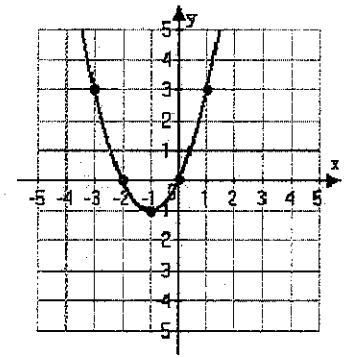
A)



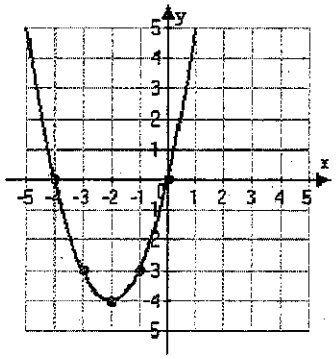
B)



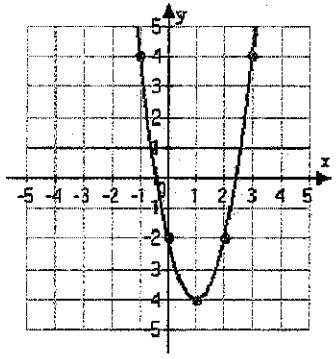
C)



D)



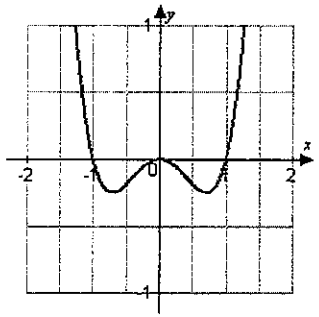
E)



91. E
92. A
93. D
94. C
95. A
96. E
97. B
98. C
99. C
100. C
101. C
102. D
103. A
104. B
105. C
106. D
107. A
108. B
109. E
110. B

45. B
46. C
47. E
48. C
49. A
50. D
51. E
52. A
53. A
54. D
55. B
56. D
57. B
58. D
59. D
60. A
61. B
62. D
63. A
64. B
65. D
66. C
67. A
68. D
69. B
70. D
71. A
72. C
73. B
74. D
75. D
76. D
77. B
78. C
79. B
80. B
81. C
82. E
83. D
84. D
85. A
86. E
87. A
88. E
89. E
90. B

6. Find the x- and y-intercepts of the graph of the equation $y = x^4 - x^2$.



A) x-intercepts: $(0,-1), (0,1)$; y-intercept: $(0,0)$

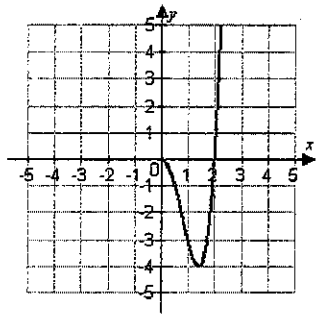
B) x-intercepts: $(-1,0), (0,0), (1,0)$; y-intercept: $(0,0)$

C) x-intercepts: $(-1,0), (1,0)$; y-intercept: $(0,0)$

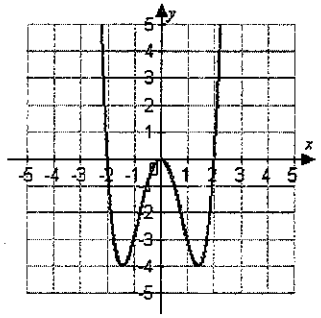
D) x-intercepts: $(-1,0), (0,0), (1,0)$; y-intercepts: none

E) x-intercepts: $(0,-1), (0,0), (0,1)$; y-intercept: $(0,0)$

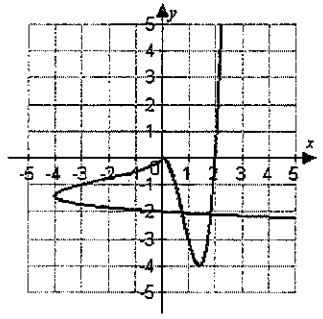
7. Assuming that the graph shown has y-axis symmetry, sketch the complete graph.



A)



B)



Answer Key

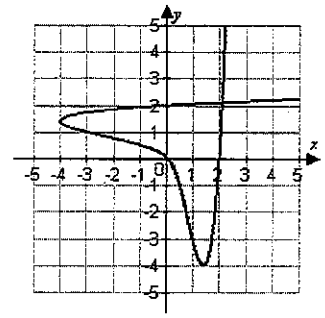
1. B
2. A
3. E
4. C
5. A
6. B
7. A
8. D
9. D
10. C
11. C
12. E
13. D
14. C
15. B
16. C
17. D
18. B
19. D
20. A
21. A
22. D
23. E
24. C
25. E
26. E
27. B
28. D
29. E
30. A
31. A
32. A
33. C
34. A
35. A
36. E
37. B
38. D
39. E
40. B
41. A
42. A
43. E
44. A

110. Find the coordinates of the point.

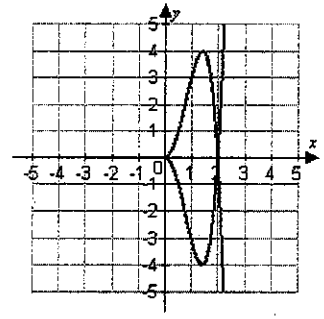
The point is located eight units to the left of the y-axis and four units below the x-axis.

A) (8, 4)
B) (–8, –4)
C) (4, –8)
D) (–4, –8)
E) (4, 8)

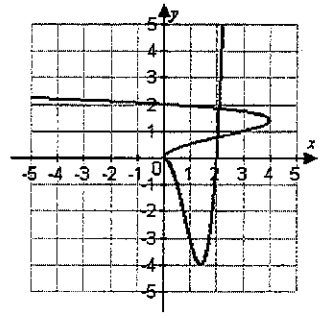
C)



D)



E)



8. Write the standard form of the equation of the circle whose radius is 4 and whose center is the point $(9,3)$.

A) $(x+9)^2+(y+3)^2=16$

B) $(x-9)^2+(y-3)^2=4$

C) $(x-3)^2+(y-9)^2=16$

D) $(x-9)^2+(y-3)^2=16$

E) $(x-3)^2+(y-9)^2=4$

9. Determine the center and radius of the circle represented by the equation $\left(x+\frac{2}{3}\right)^2+\left(y+\frac{1}{2}\right)^2=\frac{4}{9}$.

A) center: $\left(-\frac{1}{2},-\frac{2}{3}\right)$; radius: $\frac{2}{3}$

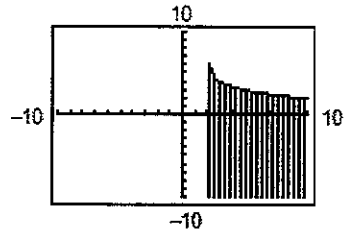
B) center: $\left(\frac{2}{3},\frac{1}{2}\right)$; radius: $\frac{4}{9}$

C) center: $\left(\frac{2}{3},\frac{1}{2}\right)$; radius: $-\frac{4}{9}$

D) center: $\left(-\frac{2}{3},-\frac{1}{2}\right)$; radius: $\frac{2}{3}$

E) center: $\left(\frac{1}{2},\frac{2}{3}\right)$; radius: $-\frac{2}{3}$

E)



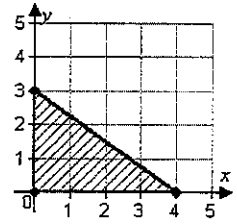
109. Find the minimum and maximum values of the objective function and where they occur, subject to the indicated constraints.

Objective function:

$z=3x+5y$

Constraints:

$$\begin{cases} x\geq 0 \\ y\geq 0 \\ 3x+4y\leq 12 \end{cases}$$



A)

minimum = −15 at $(0,3)$; maximum = 36 at $(4,0)$

B)

minimum = 12 at $(0,4)$; maximum = 15 at $(0,3)$

C)

minimum = −15 at $(0,3)$; maximum = 0 at $(0,0)$

D)

minimum = 0 at $(0,0)$; maximum = 12 at $(0,4)$

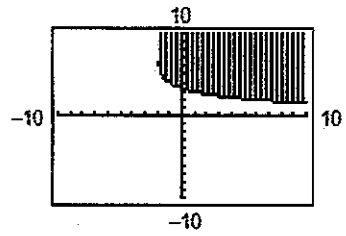
E)

minimum = 0 at $(0,0)$; maximum = 15 at $(0,3)$

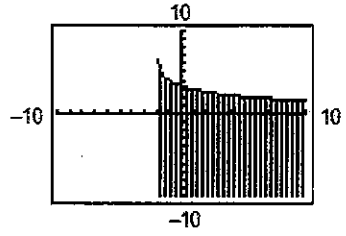
108. Use a graphing utility to graph the inequality. Shade the region representing the solution.

$y < 4 - \ln(x+2)$

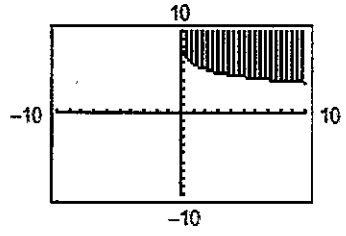
A)



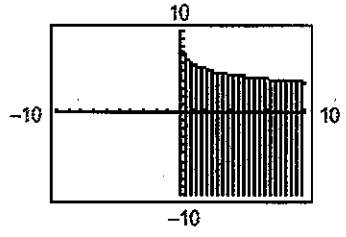
B)



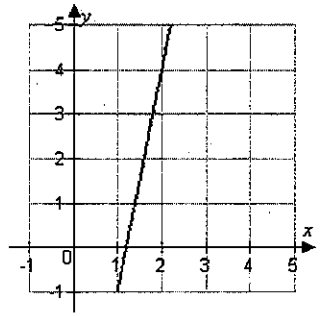
C)



D)



10. Estimate the slope of the line.



A) −5

B) 0

C) 5

D) $\frac{1}{5}$

E) $\frac{2}{5}$

11. Find the slope and y-intercept of the equation of the line.

$y = 3x - 2$

A) slope: $\frac{1}{3}$; y-intercept: −2

B) slope: $-\frac{1}{2}$; y-intercept: 3

C) slope: 3; y-intercept: −2

D) slope: −2; y-intercept: 3

E) slope: 3; y-intercept: 2

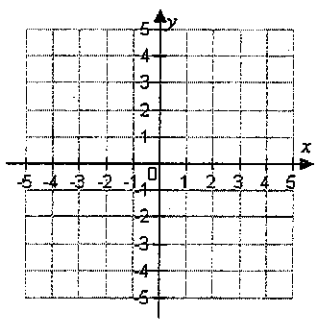
12. Find the slope and y-intercept of the equation of the line.

$-3y - 24x = -15$

A) slope: 24; y-intercept: -15
B) slope: -15; y-intercept: 24
C) slope: 24; y-intercept: -3
D) slope: 5; y-intercept: -8
E) slope: -8; y-intercept: 5

13. Plot the points and find the slope of the line passing through the pair of points.

(2, –3), (–4, 4)



A) slope: $-\frac{6}{7}$

B) slope: $\frac{6}{7}$

C) slope: $-\frac{5}{8}$

D) slope: $-\frac{7}{6}$

E) slope: $\frac{7}{6}$

107. Write the form of the partial fraction decomposition of the rational expression. Do not solve for the constants.

$$\frac{7x^2+2}{(x+6)^3}$$

A) $\frac{A}{x+6}+\frac{B}{(x+6)^2}+\frac{C}{(x+6)^3}$

B) $\frac{A}{x+6}+\frac{Bx}{(x+6)^2}+\frac{Cx^2}{(x+6)^3}$

C) $\frac{Ax^2}{(x+6)^3}+\frac{B}{(x+6)^3}$

D) $\frac{Ax+B}{x+6}+\frac{Cx+D}{(x+6)^2}+\frac{Ex+F}{(x+6)^3}$

E) $\frac{A}{x+6}+\frac{B}{(x+6)^2}$

105. Solve the system of linear equations.

$$\begin{cases} x+y+z=9 \\ x-9y+9z=-91 \\ -y+9z=-51 \end{cases}$$

A) $(7,5,-3)$

B) $(5,7,-3)$

C) $(8,6,-5)$

D) $(6,8,-5)$

E) $(11,4,-6)$

106. Write the form of the partial fraction decomposition of the rational expression. Do not solve for the constants.

$$\frac{6}{x^2+9x}$$

A) $\frac{A}{x^2}+\frac{B}{x+9}$

B) $\frac{A}{x}+\frac{Bx}{x+9}$

C) $\frac{A}{x}-\frac{Bx}{x+9}$

D) $\frac{A}{x}+\frac{B}{x+9}$

E) $\frac{Ax}{x^2}+\frac{Bx}{x+9}$

14. Find the slope-intercept form of the equation of the line that passes through the given point and has the indicated slope.

point: (4, 1) slope: $m = -5$

A) $y=-5x+1$

B) $y=-5x+9$

C) $y=-5x+21$

D) $y=-5x+4$

E) $y=-5x+3$

15. Find the slope-intercept form of the line passing through the points.

(6, –3), (5, –8)

A) $y=5x+21$

B) $y=5x-33$

C) $y=\frac{1}{5}x-\frac{21}{5}$

D) $y=-\frac{1}{5}x+\frac{33}{5}$

E) $y=-5x+27$

16. Write the slope-intercept form of the equation of the line through the given point perpendicular to the given line.

point: (5, 1) line: $3x+6y=0$

A) $y=-\frac{1}{3}x+\frac{8}{3}$

B) $y=-\frac{1}{2}x+\frac{7}{2}$

C) $y=2x-9$

D) $y=3x+16$

E) $y=2x+\frac{11}{2}$

17. Evaluate the function at the specified value of the independent variable and simplify.

$$g(s)=\begin{cases} s, & s\le -1 \\ s^2-3s, & -1<s\le 1 \\ s^3-3s^2, & s>1 \end{cases}$$

$$g\left(-\frac{1}{2}\right)$$

A) $\frac{1}{4}$

B) $\frac{2}{3}$

C) $-\frac{1}{2}$

D) $\frac{7}{4}$

E) $-\frac{7}{8}$

18. Find all real values of x such that $f(x) = 0$.

$$f(x)=25x^2-36$$

A) $\pm\frac{5}{6}$

B) $\pm\frac{6}{5}$

C) $\pm\frac{36}{25}$

D) $-\frac{36}{25}$

E) $\frac{6}{5}$

102. Determine which ordered pair is a solution of the system.

$$\begin{cases} -x+6y=12 \\ x-3y=-9 \end{cases}$$

A) (1, –6)
B) (6, 1)
C) (5, –2)
D) (–6, 1)
E) (2, 5)

103. Determine which ordered pair is a solution of the system.

$$\begin{cases} 3x-2y^2=13 \\ x-8y=13 \end{cases}$$

A) (5, –1)
B) (–6, –3)
C) (–6, 9)
D) (–1, –5)
E) (5, 1)

104. Use back-substitution to solve the system of linear equations.

$$\begin{cases} -2x-8y-6z=-6 \\ 9y-2z=-52 \\ z=8 \end{cases}$$

A) $(-4,-5,8)$

B) $(-5,-4,8)$

C) $(-5,8,-4)$

D) $(8,-4,-5)$

E) $(-1,-4,8)$

101. Find the fifth roots of $-\frac{\sqrt{3}}{2}-\frac{1}{2}i$. Write the roots in trigonometric form.

A)
$w_1 = \cos(38°)+i\sin(38°)$
$w_2 = \cos(110°)+i\sin(110°)$
$w_3 = \cos(182°)+i\sin(182°)$
$w_4 = \cos(254°)+i\sin(254°)$
$w_5 = \cos(326°)+i\sin(326°)$

B)
$w_1 = \cos(40°)+i\sin(40°)$
$w_2 = \cos(112°)+i\sin(112°)$
$w_3 = \cos(184°)+i\sin(184°)$
$w_4 = \cos(256°)+i\sin(256°)$
$w_5 = \cos(328°)+i\sin(328°)$

C)
$w_1 = \cos(42°)+i\sin(42°)$
$w_2 = \cos(114°)+i\sin(114°)$
$w_3 = \cos(186°)+i\sin(186°)$
$w_4 = \cos(258°)+i\sin(258°)$
$w_5 = \cos(330°)+i\sin(330°)$

D)
$w_1 = \cos(44°)+i\sin(44°)$
$w_2 = \cos(116°)+i\sin(116°)$
$w_3 = \cos(188°)+i\sin(188°)$
$w_4 = \cos(260°)+i\sin(260°)$
$w_5 = \cos(332°)+i\sin(332°)$

E)
$w_1 = \cos(46°)+i\sin(46°)$
$w_2 = \cos(118°)+i\sin(118°)$
$w_3 = \cos(190°)+i\sin(190°)$
$w_4 = \cos(262°)+i\sin(262°)$
$w_5 = \cos(334°)+i\sin(334°)$

19. Find all real values of x such that $f(x) = 0$.

$f(x)=\frac{9x-6}{4}$

A) $\frac{1}{6}$
B) $\pm\frac{1}{6}$
C) $\pm\frac{2}{3}$
D) $\frac{2}{3}$
E) $-\frac{2}{3}$

20. Find the domain of the function.

$q(y)=\frac{7y}{y+7}$

A) all real numbers $y \neq -7$
B) all real numbers $y \neq -7,\ y \neq 0$
C) all real numbers
D) $y=-7, y=0$
E) $y=-7$

21. Find the domain of the function.

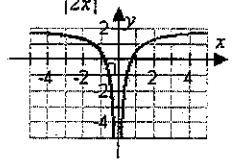
$f(t)=\sqrt{16-t^2}$

A) $-4 \leq t \leq 4$
B) $t \leq -4$ or $t \geq 4$
C) $t \geq 0$
D) $t \leq 4$
E) all real numbers

22. Use the Vertical Line Test to determine in which of the graphs y is **not** a function of x.

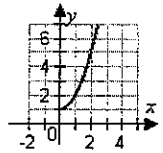
A)

$y = -\left|\frac{3}{2x}\right| - 2$



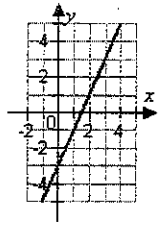
B)

$x = \sqrt{y-1}$



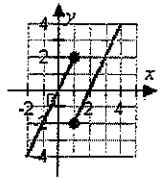
C)

$y = 2x + 3$



D)

$y = \begin{cases} 4, & x \le -1 \\ 2, & x \ge -1 \end{cases}$



E) All of the choices (A, B, C, and D) represent functions.

99. Find the trigonometric form of the complex number shown below.

$-5i$

A) $5(\cos 0 + i\sin 0)$

B) $5(\cos \pi + i\sin \pi)$

C) $5\left(\cos\frac{3\pi}{2} + i\sin\frac{3\pi}{2}\right)$

D) $5\left(\cos\frac{\pi}{4} + i\sin\frac{\pi}{4}\right)$

E) $5\left(\cos\frac{\pi}{2} + i\sin\frac{\pi}{2}\right)$

100. Perform the operation shown below and leave the result in trigonometric form.

$\left[2\left(\cos\frac{5\pi}{6} + i\sin\frac{5\pi}{6}\right)\right]\left[3\left(\cos\frac{2\pi}{7} + i\sin\frac{2\pi}{7}\right)\right]$

A) $\left[6\left(\cos\frac{5\pi}{21} + i\sin\frac{5\pi}{21}\right)\right]$

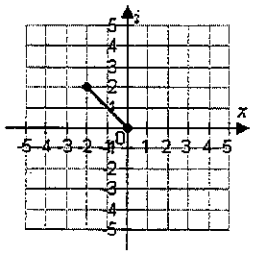
B) $\left[5\left(\cos\frac{5\pi}{21} + i\sin\frac{5\pi}{21}\right)\right]$

C) $\left[6\left(\cos\frac{47\pi}{42} + i\sin\frac{47\pi}{42}\right)\right]$

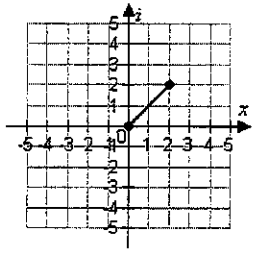
D) $\left[5\left(\cos\frac{47\pi}{42} + i\sin\frac{47\pi}{42}\right)\right]$

E) $\left[6\left(\cos\frac{5\pi}{6} + i\sin\frac{5\pi}{6}\right)\right]$

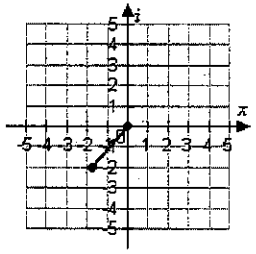
C)



D)



E)



23. Write the linear function f such that it has the indicated values.

$f(-3) = 1, \quad f(-7) = 8$

A) $y = -\frac{4}{15}x + \frac{1}{5}$

B) $y = -\frac{15}{4}x - \frac{41}{4}$

C) $y = \frac{7}{4}x + \frac{25}{4}$

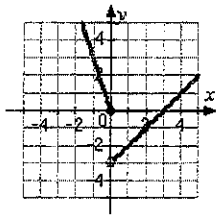
D) $y = -\frac{4}{7}x - \frac{5}{7}$

E) $y = -\frac{7}{4}x - \frac{17}{4}$

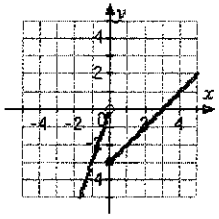
24. Which graph represents the function?

$$f(x) = \begin{cases} -3x, & x < 0 \\ x - 3, & x \geq 0 \end{cases}$$

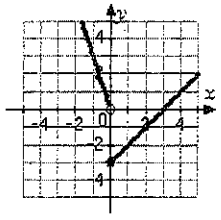
A)



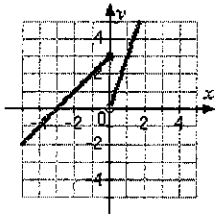
B)



C)

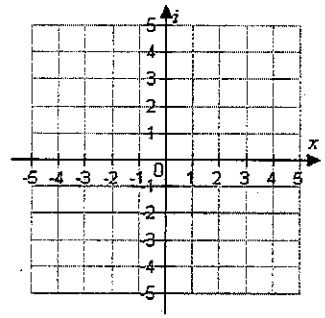


D)

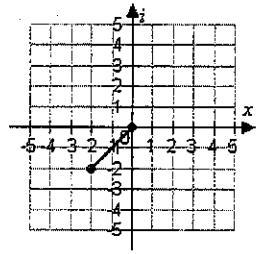


98. Represent the complex number below graphically.

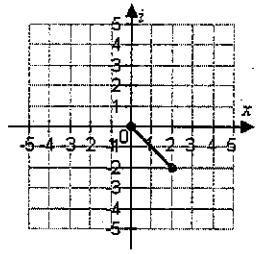
$-2 + 2i$



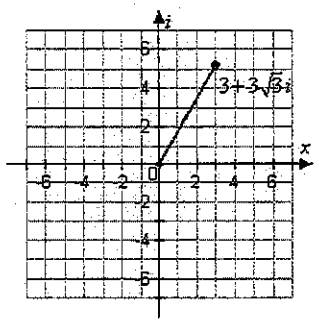
A)



B)



97. Write the complex number shown below in trigonometric form.



A)

$$6\left(\cos\frac{5\pi}{3}+i\sin\frac{5\pi}{3}\right)$$

B)

$$6\left(\cos\frac{\pi}{3}+i\sin\frac{\pi}{3}\right)$$

C)

$$6\left(\cos\frac{4\pi}{3}+i\sin\frac{4\pi}{3}\right)$$

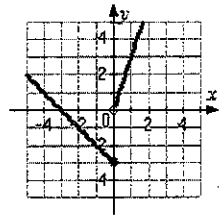
D)

$$6\left(\cos\frac{\pi}{4}+i\sin\frac{\pi}{4}\right)$$

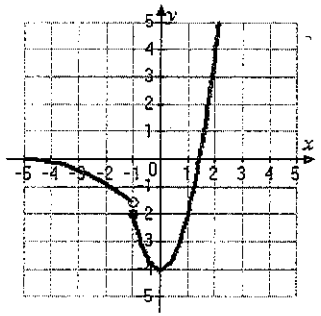
E)

$$6\left(\cos\frac{\pi}{6}+i\sin\frac{\pi}{6}\right)$$

E)



25. Which function does the graph represent?



A)
$$f(x)=\begin{cases}-\dfrac{(x+5)^2}{10} & <-1\\ -2x^2-4 & \geq -1\end{cases}$$

B)
$$f(x)=\begin{cases}\dfrac{(x+5)^2}{10} & \leq -1\\ -2x^2-4 & >-1\end{cases}$$

C)
$$f(x)=\begin{cases}\dfrac{(x+5)^2}{10} & <-1\\ -2x^2+4 & \geq -1\end{cases}$$

D)
$$f(x)=\begin{cases}-\dfrac{(x+5)^2}{10} & <-1\\ 2x^2+4 & \geq -1\end{cases}$$

E)
$$f(x)=\begin{cases}-\dfrac{(x+5)^2}{10} & <-1\\ 2x^2-4 & \geq -1\end{cases}$$

92. Given $\mathbf{u}=-3\mathbf{i}-4\mathbf{j}$ and $\mathbf{v}=2\mathbf{i}-\mathbf{j}$, determine $2\mathbf{u}+9\mathbf{v}$.
A) $2\mathbf{u}+9\mathbf{v}=12\mathbf{i}-17\mathbf{j}$
B) $2\mathbf{u}+9\mathbf{v}=-29\mathbf{i}-5\mathbf{j}$
C) $2\mathbf{u}+9\mathbf{v}=-23\mathbf{i}-15\mathbf{j}$
D) $2\mathbf{u}+9\mathbf{v}=10\mathbf{i}-15\mathbf{j}$
E) $2\mathbf{u}+9\mathbf{v}=-15\mathbf{i}+15\mathbf{j}$

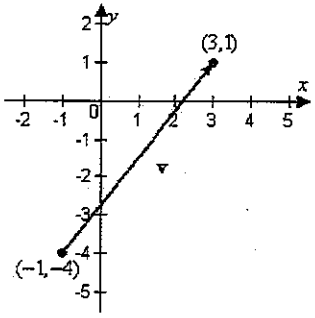
93. Find the magnitude and direction angle of $\mathbf{v}=-2\mathbf{i}-2\mathbf{j}$. Round direction angle to nearest degree.
A) $\|\mathbf{v}\|=6\sqrt{2}\,;\ \theta=220°$
B) $\|\mathbf{v}\|=5\sqrt{2}\,;\ \theta=227°$
C) $\|\mathbf{v}\|=3\sqrt{2}\,;\ \theta=235°$
D) $\|\mathbf{v}\|=2\sqrt{2}\,;\ \theta=225°$
E) $\|\mathbf{v}\|=4\sqrt{2}\,;\ \theta=217°$

94. Given $\mathbf{u}=\langle -5,6\rangle$ and $\mathbf{v}=\langle -3,3\rangle$, find $\mathbf{u}\cdot\mathbf{v}$.
A) –3
B) 15
C) 33
D) –33
E) 3

95. Given $\mathbf{u}=-5\mathbf{i}+4\mathbf{j}$ and $\mathbf{v}=6\mathbf{i}+5\mathbf{j}$, find $\mathbf{u}\cdot\mathbf{v}$.
A) –10
B) –30
C) –50
D) –1
E) –49

96. Find the absolute value of the complex number $4-6i$.
A) $\sqrt{10}$
B) $3\sqrt{10}$
C) 52
D) $5\sqrt{13}$
E) $2\sqrt{13}$

90. Find the component form of vector v.



A) $\mathbf{v} = \langle -4, -5 \rangle$

B) $\mathbf{v} = \langle 4, 5 \rangle$

C) $\mathbf{v} = \langle -5, 4 \rangle$

D) $\mathbf{v} = \langle 4, -5 \rangle$

E) $\mathbf{v} = \langle -4, 1 \rangle$

91. Given $\mathbf{u} = \langle -2, 5 \rangle$ and $\mathbf{v} = \langle -5, -1 \rangle$, determine $-2\mathbf{u} - 6\mathbf{v}$.

A) $-2\mathbf{u} - 6\mathbf{v} = \langle 10, 10 \rangle$

B) $-2\mathbf{u} - 6\mathbf{v} = \langle 22, 10 \rangle$

C) $-2\mathbf{u} - 6\mathbf{v} = \langle 14, 16 \rangle$

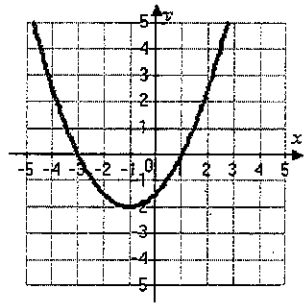
D) $-2\mathbf{u} - 6\mathbf{v} = \langle 20, 10 \rangle$

E) $-2\mathbf{u} - 6\mathbf{v} = \langle 34, -4 \rangle$

26. Use the graph of

$f(x) = x^2$

to write an equation for the function whose graph is shown.



A) $f(x) = (x+1)^2 - 2$

B) $f(x) = (x-1)^2 - 2$

C) $f(x) = (x+1)^2 + 2$

D) $f(x) = \frac{1}{2}(x-1)^2 - 2$

E) $f(x) = \frac{1}{2}(x+1)^2 - 2$

27. Write an equation for the function that is described by the following characteristics:

the shape of $f(x) = x^2$, but moved three units down, seven units to the left, and then reflected in the x-axis

A) $g(x) = 3 - (x-7)^2$

B) $g(x) = 3 - (x+7)^2$

C) $g(x) = -(x+7)^2 - 3$

D) $g(x) = -(x+3)^2 - 7$

E) $g(x) = 7 - (x+3)^2$

28. Find $(f+g)(x)$.

$f(x) = -7x^2 - 6x - 9$
$g(x) = -4x^2 - 4$
A) $(f+g)(x) = -3x^4 - 6x - 5$
B) $(f+g)(x) = -11x^4 - 6x - 13$
C) $(f+g)(x) = -3x^2 - 6x - 5$
D) $(f+g)(x) = -11x^2 - 6x - 13$
E) $(f+g)(x) = 11x^2 + 6x + 13$

29. Find $(fg)(x)$.

$f(x) = \sqrt{6x}$ $\quad g(x) = \sqrt{-9x+1}$
A) $(fg)(x) = 3x\sqrt{-6} + \sqrt{6x}$
B) $(fg)(x) = 3x\sqrt{-6+6x}$
C) $(fg)(x) = \sqrt{-3x+1}$
D) $(fg)(x) = \sqrt{-54x^2+1}$
E) $(fg)(x) = \sqrt{-54x^2+6x}$

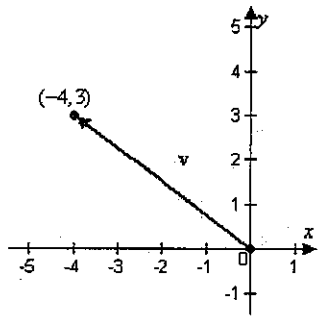
30. Evaluate the indicated function for $f(x) = x^2 - 7$ and $g(x) = x + 9$.

$(fg)(3)$
A) 24
B) –192
C) –36
D) –12
E) –138

31. Find $f \circ g$.

$f(x) = 4x - 3$ $\quad g(x) = x + 1$
A) $(f \circ g)(x) = 4x + 1$
B) $(f \circ g)(x) = 4x - 2$
C) $(f \circ g)(x) = 4x^2 + x - 3$
D) $(f \circ g)(x) = 3x - 4$
E) $(f \circ g)(x) = 3x - 2$

89. Find the magnitude of vector v.



A) $\|v\| = 6\sqrt{3}$

B) $\|v\| = 2\sqrt{7}$

C) $\|v\| = 6$

D) $\|v\| = 4\sqrt{2}$

E) $\|v\| = 5$

88. Two ocean liners leave from the same port in Puerto Rico at 10:00 a.m. One travels at a bearing of N 47° W at 16 miles per hour, and the other travels at a bearing of S 53° W at 17 miles per hour. Approximate the distance between them at noon the same day. Round answer to two decimal places.

A) 26.69 miles
B) 46.18 miles
C) 32.16 miles
D) 30.58 miles
E) 42.45 miles

32. Find the inverse function of $f(x) = -4x - 3$

A) $g(x) = -\frac{x+3}{4}$
B) $g(x) = -3x - 4$
C) $g(x) = -\frac{x-3}{4}$
D) $g(x) = -\frac{x}{3}$
E) $g(x) = -\frac{1}{4}x + 3$

33. Find a mathematical model for the verbal statement:
"In a wire, the strength of a magnetic field B is directly proportional to the force F and inversely proportional to the product of the current I and the length of the wire L."

A) $B = kFIL$
B) $B = \frac{kIL}{F}$
C) $B = \frac{kF}{IL}$
D) $B = \frac{k}{FIL}$
E) $B = \frac{kFL}{I}$

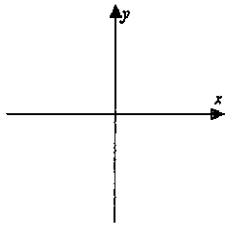
34. Determine the quadrant in which the angle lies. (The angle measure is given in radians.)

$\frac{2\pi}{3}$

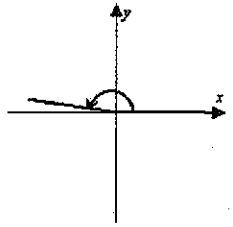
A) II
B) III
C) IV
D) I
E) The angle lies on a coordinate axis.

35. Sketch the angle in standard position.

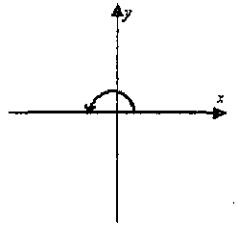
3



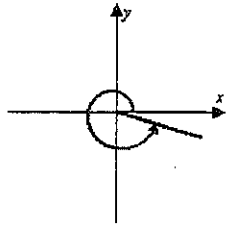
A)



B)



C)



86. Given $a=12$, $b=8$, and $c=5$, use the Law of Cosines to solve the triangle for the value of A. Round answer to two decimal places.

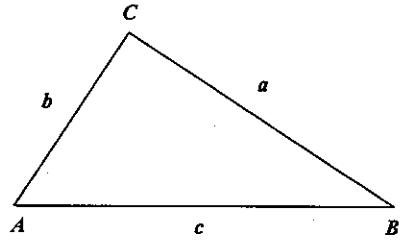


Figure not drawn to scale

A) 60.33°
B) 17.61°
C) 80.44°
D) 28.96°
E) 133.43°

87. Given $A=99°$, $b=12$, and $c=14$, use the Law of Cosines to solve the triangle for the value of a. Round answer to two decimal places.

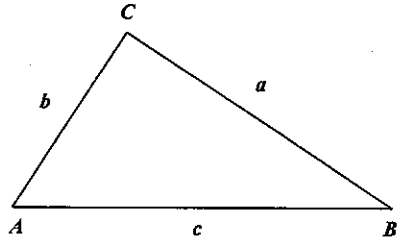


Figure not drawn to scale

A) 19.81
B) 18.38
C) 19.46
D) 16.95
E) 19.10

83. Use a double-angle formula to find the exact value of $\cos 2u$ when $\sin u = \frac{7}{25}$, where $\frac{\pi}{2} < u < \pi$.

A) $\cos 2u = -\frac{478}{625}$

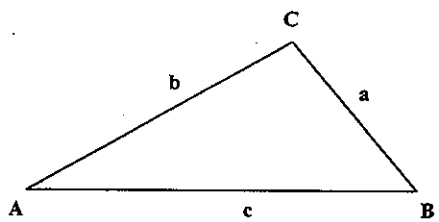
B) $\cos 2u = \frac{168}{625}$

C) $\cos 2u = \frac{336}{625}$

D) $\cos 2u = \frac{527}{625}$

E) $\cos 2u = -\frac{1152}{625}$

84. Given $A = 59°$, $B = 66°$, and $a = 4.1$, use the Law of Sines to solve the triangle for the value of b. Round answer to two decimal places.

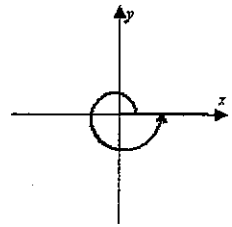


A) $b = 3.68$
B) $b = 3.92$
C) $b = 4.29$
D) $b = 4.37$
E) $b = 3.85$

85. Given $A = 26°$, $B = 36°$, and $c = 15$, use the Law of Sines to solve the triangle for the value of b. Round answer to two decimal places.

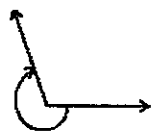
A) $a = 9.99$
B) $a = 11.22$
C) $a = 10.67$
D) $a = 8.77$
E) $a = 12.10$

D)



E) none of these

36. Estimate, to the tens place, the number of degrees in the angle.

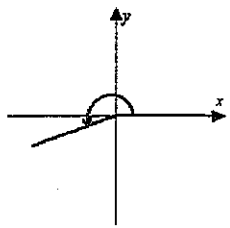


A) $-110°$
B) $-300°$
C) $-170°$
D) $-220°$
E) $-250°$

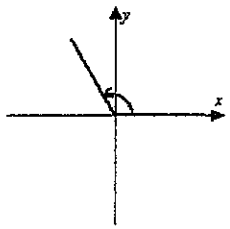
37. Sketch the angle in standard position.

120°

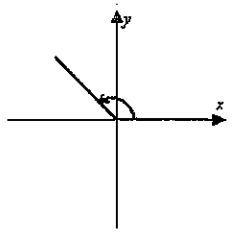
A)



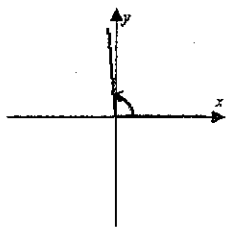
B)



C)



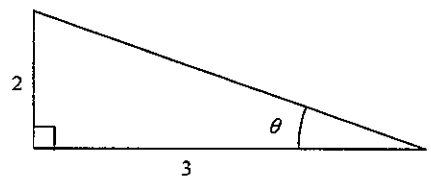
D)



E) none of these

82. Use the figure below to determine the exact value of the given function.

$\csc 2\theta$



A) $\csc 2\theta = \frac{13}{7}$

B) $\csc 2\theta = \frac{13}{9}$

C) $\csc 2\theta = \frac{13}{5}$

D) $\csc 2\theta = \frac{12}{5}$

E) $\csc 2\theta = \frac{13}{12}$

79. Write the given expression as the cosine of an angle.
$\cos 20° \cos 65° - \sin 20° \sin 65°$

A) $\cos(65°)$

B) $\cos(85°)$

C) $\cos(-45°)$

D) $\cos(20°)$

E) $\cos(-130°)$

80. Write the given expression as the sine of an angle.
$\sin 35° \cos 50° + \sin 50° \cos 35°$

A) $\sin(-100°)$

B) $\sin(85°)$

C) $\sin(-15°)$

D) $\sin(35°)$

E) $\sin(50°)$

81. Find the exact value of $\sin(u+v)$ given that $\sin u = \frac{3}{5}$ and $\cos v = -\frac{24}{25}$. (Both u and v are in Quadrant II.)

A) $\sin(u+v) = -\frac{44}{125}$

B) $\sin(u+v) = \frac{44}{125}$

C) $\sin(u+v) = -\frac{4}{5}$

D) $\sin(u+v) = -\frac{3}{5}$

E) $\sin(u+v) = \frac{4}{5}$

38. Rewrite the given angle in radian measure as a multiple of π. (Do not use a calculator.)
$60°$

A) $\frac{4\pi}{3}$

B) π

C) $\frac{\pi}{6}$

D) $\frac{\pi}{3}$

E) $\frac{7\pi}{18}$

39. Rewrite the given angle in degree measure. (Do not use a calculator.)
$\frac{5\pi}{4}$

A) 450°

B) 255°

C) 195°

D) 240°

E) 225°

40. Find the area of the sector of the circle with radius r and central angle θ.
radius: r = 3 meters central arc: $\theta = \frac{19\pi}{12}$

A) $\frac{19\pi}{12}$ square meters

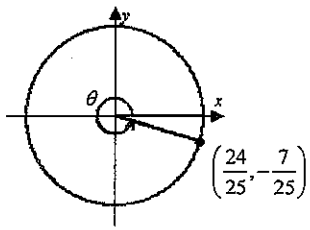
B) $\frac{57\pi}{8}$ square meters

C) $\frac{57\pi}{4}$ square meters

D) $\frac{19\pi}{4}$ square meters

E) $\frac{19}{4}$ square meters

41. Determine the exact value of $\sin\theta$.



A) $-\frac{7}{25}$

B) $\frac{7}{25}$

C) $-\frac{25}{7}$

D) $\frac{25}{7}$

E) $-\frac{24}{7}$

77. Solve the following equation.

$\tan^2 x + \tan x = 0$

A) $x = \pi + 2n\pi$ and $x = \frac{3\pi}{2} + 2n\pi$, where n is an integer

B) $x = n\pi$ and $x = \frac{3\pi}{4} + n\pi$, where n is an integer

C) $x = \frac{2\pi}{3} + 2n\pi$ and $x = \frac{5\pi}{3} + 2n\pi$, where n is an integer

D) $x = n\pi$ and $x = \frac{\pi}{2} + n\pi$, where n is an integer

E) $x = n\pi$ and $x = \frac{3\pi}{2} + 2n\pi$, where n is an integer

78. Find the exact value of the given expression using a sum or difference formula.

$\sin 165°$

A) $\frac{-\sqrt{3}-1}{2\sqrt{2}}$

B) $\frac{-\sqrt{3}+1}{2\sqrt{2}}$

C) $\frac{\sqrt{3}-1}{2\sqrt{2}}$

D) $\frac{\sqrt{3}+1}{2\sqrt{2}}$

76. Which of the following is a solution to the given equation?

$2\cos x + \sqrt{3} = 0$

A) $x = \frac{2\pi}{3}$

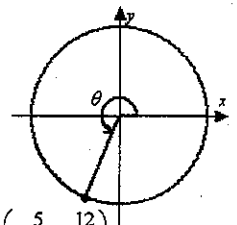
B) $x = \frac{\pi}{4}$

C) $x = \frac{\pi}{6}$

D) $x = \frac{7\pi}{6}$

E) $x = \frac{7\pi}{4}$

42. Determine the exact value of $\sec\theta$.



$\left(-\frac{5}{13}, -\frac{12}{13}\right)$

A) $-\frac{13}{5}$

B) $\frac{13}{5}$

C) $-\frac{5}{13}$

D) $\frac{5}{13}$

E) 1

43. Find the point (x, y) on the unit circle that corresponds to the real number t.

$t = \frac{3\pi}{4}$

A) $(0, -1)$

B) $\left(-\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$

C) $\left(-\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2}\right)$

D) $\left(\frac{\sqrt{3}}{2}, -\frac{1}{2}\right)$

E) $\left(-\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)$

44. Evaluate the trigonometric function using its period as an aid.

$\cos\left(-\frac{5\pi}{3}\right)$

A) $\frac{1}{2}$

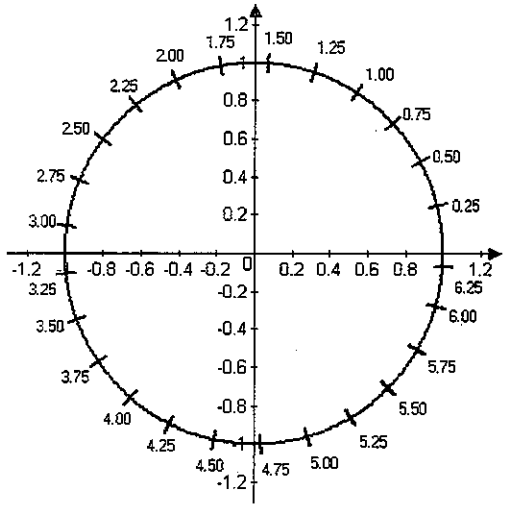
B) $-\frac{1}{2}$

C) $\frac{\sqrt{3}}{2}$

D) $-\frac{\sqrt{3}}{2}$

E) $\frac{2\sqrt{3}}{3}$

45. Use the figure and a straightedge to approximate the value of $\sin 4$



A) 0.07
B) –0.76
C) –0.65
D) 1.16
E) –1.32

75. Which of the following is a solution to the given equation?

$2\tan x - 2 = 0$

A) $x = \frac{7\pi}{6}$

B) $x = \frac{2\pi}{3}$

C) $x = \frac{5\pi}{6}$

D) $x = \frac{5\pi}{4}$

E) $x = \frac{7\pi}{4}$

73. Which of the following is equivalent to the given expression?

$$\frac{\cot^2 x}{\csc x + 1}$$

A) $\csc x + 2\sec x$

B) $\csc x - 1$

C) $\cot x + 2$

D) $\tan^2 x - \cot^2 x$

E) $-2\sec x \csc^2 x$

74. Which of the following is *not* an identity?

A) $\sin^2 x + \cos^2 x = 1$

B) $1 = \sec^2 x - \tan^2 x$

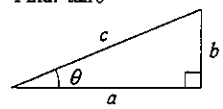
C) $\tan^2 x + 1 = \sec^2 x$

D) $\cos^2 x = 1 + \sin^2 x$

E) $\csc^2 x - 1 = \cot^2 x$

46. Find the exact value of the given trigonometric function of the angle θ shown in the figure. (Use the Pythagorean Theorem to find the third side of the triangle.)

Find: $\tan\theta$



$b = 16, c = 34$

A) $\frac{15}{17}$

B) $\frac{8}{17}$

C) $\frac{8}{15}$

D) $\frac{15}{8}$

E) $\frac{17}{8}$

47. Given that $\cos\theta = \frac{7}{11}$, find $\csc\theta$.

[Hint: Sketch a right triangle corresponding to the trigonometric function of the acute angle θ, then use the Pythagorean Theorem to determine the third side.]

A) $\frac{6\sqrt{2}}{11}$

B) $\frac{11}{7}$

C) $\frac{7}{6\sqrt{2}}$

D) $66\sqrt{2}$

E) $\frac{11}{6\sqrt{2}}$

48. Given that $\sin\theta = \frac{6}{11}$, find $\tan\theta$.

[Hint: Sketch a right triangle corresponding to the trigonometric function of the acute angle θ, then use the Pythagorean Theorem to determine the third side.]

A) $\frac{\sqrt{85}}{11}$

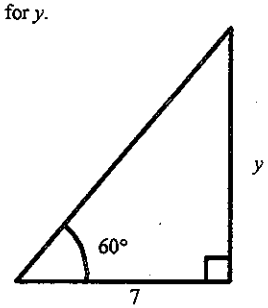
B) $\frac{11}{6}$

C) $\frac{6}{\sqrt{85}}$

D) $11\sqrt{85}$

E) $\frac{11}{\sqrt{85}}$

49. Solve for y.



A) $y = 7\sqrt{3}$

B) $y = \frac{7\sqrt{2}}{3}$

C) $y = \frac{\sqrt{3}}{7}$

D) $y = \frac{7}{\sqrt{3}}$

E) $y = 7\sqrt{2}$

72. Factor; then use fundamental identities to simplify the expression below and determine which of the following is *not* equivalent.

$\sin^2\alpha\csc^2\alpha - \sin^2\alpha$

A) $\cos^2\alpha$

B) $1 - \sin^2\alpha$

C) $\tan^2\alpha$

D) $\sin^2\left(\frac{\pi}{2} - \alpha\right)$

E) $\frac{1}{\sec^2\alpha}$

71. Use fundamental identities to simplify the expression below and then determine which of the following is *not* equivalent.

$$\cos\left(\frac{\pi}{2}-x\right)\sec x$$

A) 1

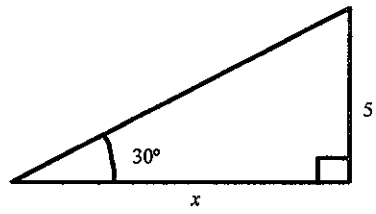
B) $\dfrac{\sin x}{\cos x}$

C) $\dfrac{1}{\cot x}$

D) $\sin x \sec x$

E) $\tan x$

50. Solve for x.



A) $x=\dfrac{15}{\sqrt{3}}$

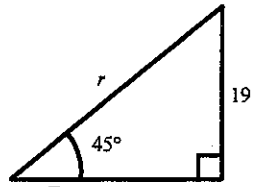
B) $x=\dfrac{5\sqrt{2}}{3}$

C) $x=\dfrac{5}{\sqrt{3}}$

D) $x=5\sqrt{3}$

E) $x=5\sqrt{2}$

51. Solve for r.



A) $r=\dfrac{19\sqrt{3}}{2}$

B) $r=\dfrac{19\sqrt{2}}{2}$

C) $r=\dfrac{19}{\sqrt{3}}$

D) $r=\dfrac{\sqrt{3}}{38}$

E) $r=19\sqrt{2}$

52. The point $(11,-4)$ is on the terminal side of an angle in standard position. Determine the exact value of $\tan\theta$.

A) $-\frac{4}{11}$

B) $-\frac{4}{\sqrt{137}}$

C) $-\frac{11}{4}$

D) $-\frac{4}{7}$

E) $-\frac{4}{\sqrt{7}}$

53. Use the function value and constraint below to evaluate the given trigonometric function.

Function Value	*Constraint*	*Evaluate:*
$\sin\theta=\frac{5}{13}$	θ lies in Quadrant II.	$\tan\theta$

A) $-\frac{5}{12}$

B) $\frac{5}{12}$

C) $-\frac{12}{5}$

D) $-\frac{12}{13}$

E) $\frac{5}{\sqrt{17}}$

70. Use fundamental identities to simplify the expression below and then determine which of the following is *not* equivalent.

$\sin\alpha(\csc\alpha-\sin\alpha)$

A) $1-\sin^2\alpha$

B) $\frac{\csc^2\alpha-1}{\csc^2\alpha}$

C) $\frac{\csc^2\alpha-\sec^2\alpha+\tan^2\alpha}{\csc^2\alpha}$

D) $1-\cot^2\alpha$

E) $\cos^2\alpha$

69. If $\sin x = \frac{1}{2}$ and $\cos x = \frac{\sqrt{3}}{2}$, evaluate the following function.

$\sec x$

A) $\sec x = \frac{1}{3}$

B) $\sec x = \frac{2\sqrt{3}}{3}$

C) $\sec x = \sqrt{3}$

D) $\sec x = 2$

E) $\sec x = \frac{\sqrt{3}}{3}$

54. Find the reference angle θ' for the given angle θ.

$\theta = 240°$

A) 150°
B) –150°
C) 70°
D) 60°
E) 50°

55. Find the reference angle θ' for the given angle θ.

$\theta = -\frac{13\pi}{6}$

A) π
B) $\frac{\pi}{6}$
C) $\frac{\pi}{3}$
D) 0
E) $\frac{2\pi}{3}$

56. Evaluate the cosine of the angle without using a calculator.

$\frac{4\pi}{3}$

A) $-\frac{\sqrt{2}}{2}$
B) $\frac{\sqrt{3}}{2}$
C) $-\frac{\sqrt{3}}{2}$
D) $-\frac{1}{2}$
E) 0

57. Evaluate the tangent of the angle without using a calculator.

$$-\frac{5\pi}{6}$$

A) $\frac{\sqrt{3}}{2}$

B) $\frac{\sqrt{3}}{3}$

C) $\sqrt{3}$

D) $\frac{1}{2}$

E) 0

58. Evaluate the sine of the angle without using a calculator.

$$-150°$$

A) $-\frac{\sqrt{2}}{2}$

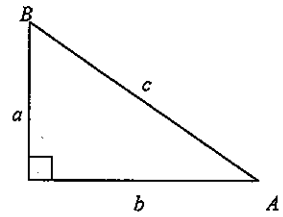
B) $\frac{\sqrt{2}}{2}$

C) $-\frac{\sqrt{3}}{2}$

D) $-\frac{1}{2}$

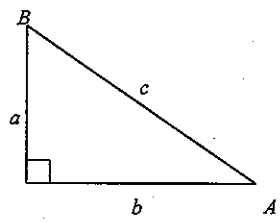
E) 0

67. If $B = 58°$ and $a = 6$, determine the value of c. Round to two decimal places.



A) 11.32
B) 3.75
C) 7.08
D) 9.60
E) 5.09

68. If $a = 8$ and $c = 19$, determine the value of A. Round to two decimal places.



A) 65.10°
B) 67.17°
C) 22.83°
D) 24.90°
E) 70.10°

65. Use the properties of inverse trigonometric functions to evaluate $\arcsin\left[\sin\left(\frac{2\pi}{5}\right)\right]$.

A) $-\frac{3\pi}{5}$

B) $\frac{2\pi}{3}$

C) $\frac{5\pi}{2}$

D) $\frac{2\pi}{5}$

E) $\frac{\pi}{5}$

66. Find the exact value of $\sin\left(\arctan\frac{3}{4}\right)$.

A) $\frac{3}{4}$

B) $\frac{8}{5}$

C) $\frac{3}{5}$

D) $\frac{3}{8}$

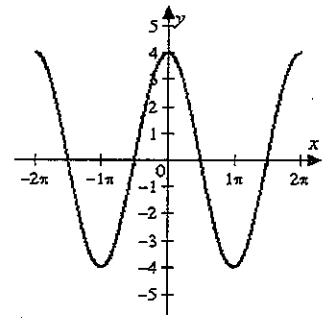
E) $\frac{4}{3}$

59. Given the graph of $f(x)$ below, sketch the graph of

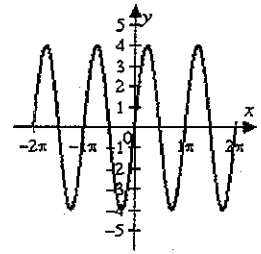
$$g(x) = 4\cos\left(2x + \frac{\pi}{2}\right)$$

without the use of a graphing utility.

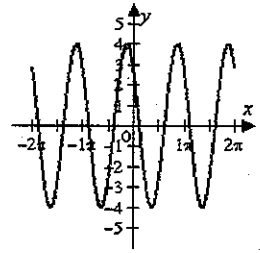
$f(x) = 4\cos x$



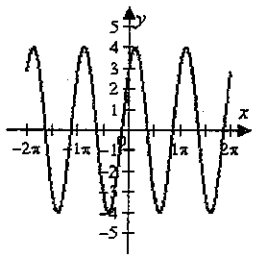
A)



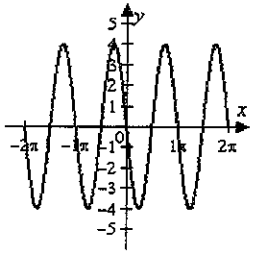
B)



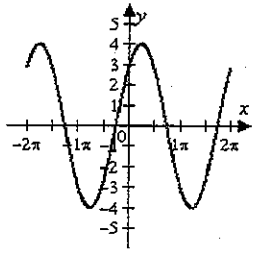
C)



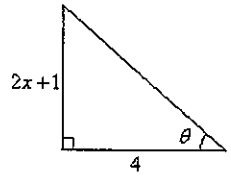
D)



E)



64. Use an inverse function to write θ as a function of x.



A)

$\theta = \tan^{-1}\left(\frac{4}{2x+1}\right)$

B)

$\theta = \tan^{-1}\left(\frac{2x+1}{4}\right)$

C)

$\theta = \tan^{-1}\left(\frac{x+1}{2}\right)$

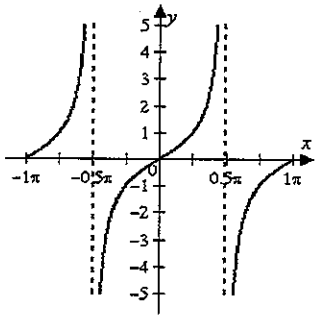
D)

$\theta = \tan^{-1}\left(\frac{1}{x+1}\right)$

E)

$\theta = \tan^{-1}(2x+1)$

62. Which of the following functions is represented by the graph below?



A)

$y = -3\csc\frac{\pi x}{2}$

B)

$y = \frac{1}{3}\cot\frac{\pi x}{2}$

C)

$y = \sec 2x$

D)

$y = \tan(x + \pi)$

E)

$y = \tan\frac{x}{3}$

63. Evaluate $\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)$ without using a calculator.

A) $\frac{5\pi}{6}$

B) $-\frac{2\pi}{3}$

C) $\frac{3\pi}{4}$

D) $-\frac{\pi}{3}$

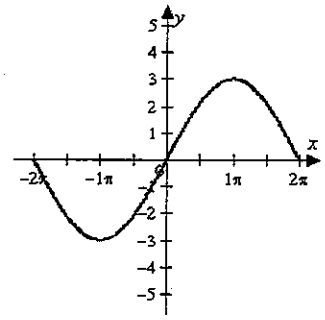
E) $-\frac{5\pi}{6}$

60. Given the graph of $f(x)$ below, sketch the graph of

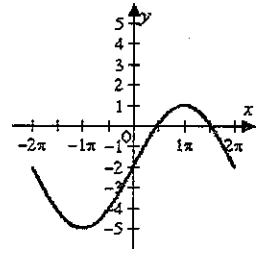
$g(x) = 3\sin\frac{x}{2} - 2$

without the use of a graphing utility.

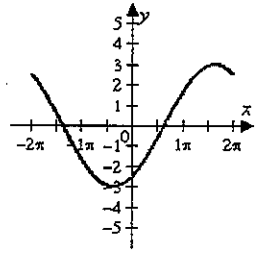
$f(x) = 3\sin\frac{x}{2}$



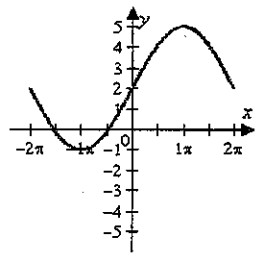
A)



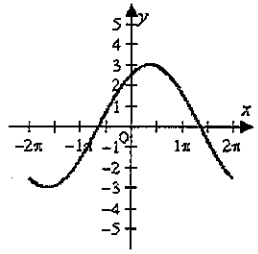
B)



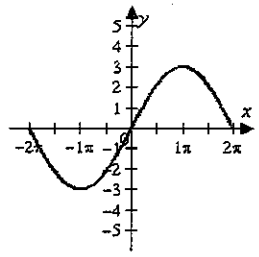
C)



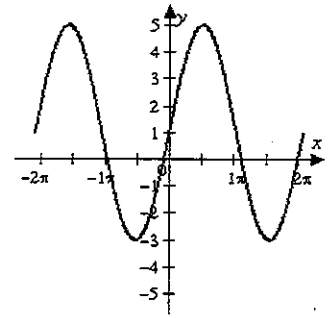
D)



E)



61. Find a and d for the function $f(x) = a\sin x + d$ such that the graph of $f(x)$ matches the graph below.



A) $a = 2,\ d = -1$

B) $a = 4;\ d = 1$

C) $a = -2;\ d = 1$

D) $a = 2;\ d = 2$

E) $a = 4;\ d = -3$