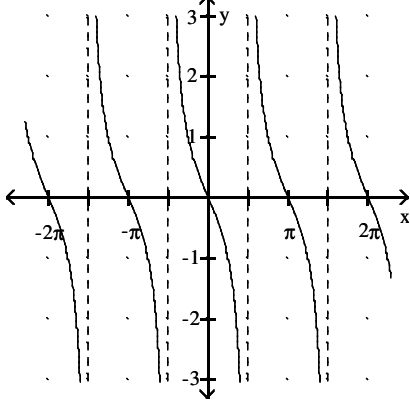
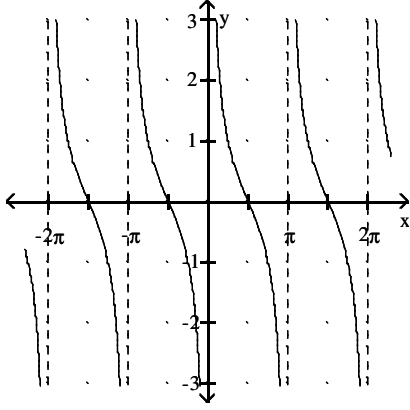


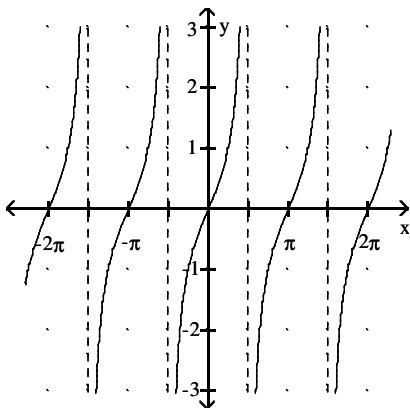
Match each function with its graph.

- 1) $y = \tan x$ 2) $y = \cot x$
3) $y = -\tan x$ 4) $y = -\cot x$

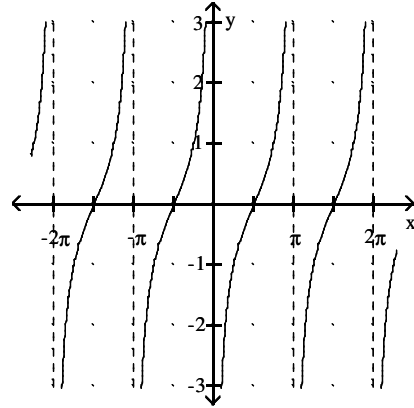
A)



C)



B)



- A) 1A, 2D, 3C, 4B B) 1B, 2D, 3C, 4A
C) 1A, 2B, 3C, 4D D) 1C, 2A, 3B, 4D

Use a graphing calculator to determine which expression completes the identity.

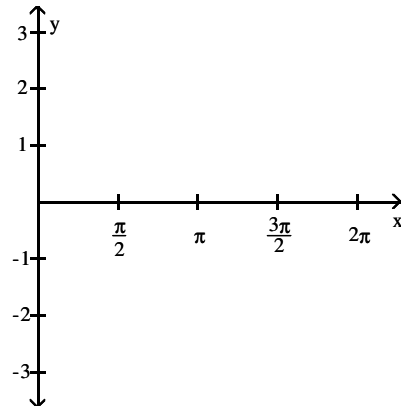
2) The expression $\frac{\sec \theta + \csc \theta}{\tan \theta + 1}$

is to be the left hand side of an equation that is an identity. Which one of the following four expressions can be used as the right hand side of the equation to complete the identity?

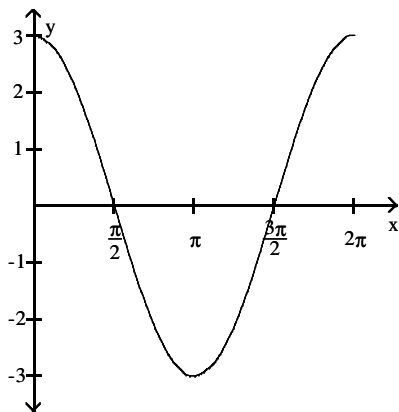
- A) $\tan \theta$ B) $\csc \theta$
C) $\sec \theta$ D) $\cos \theta$

Graph the function over a one-period interval.

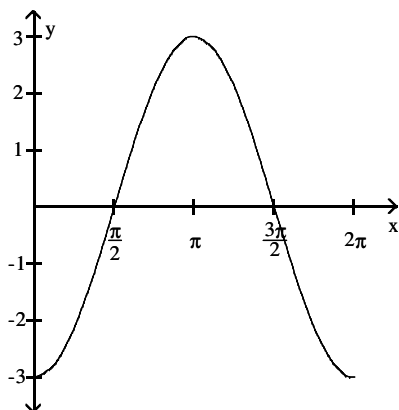
3) $y = -3 \cos \left(x + \frac{\pi}{2} \right)$



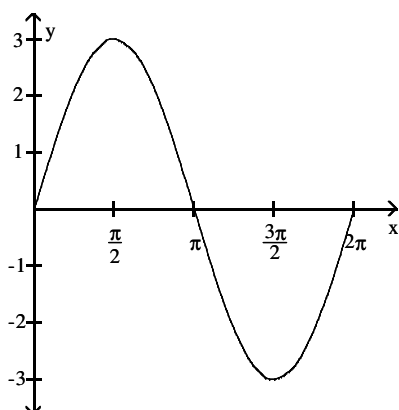
A)



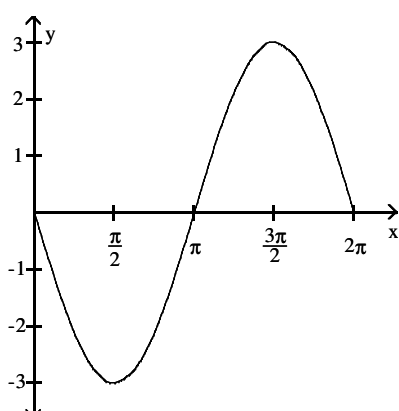
B)



C)



D)



Use a graphing calculator to determine which expression completes the identity.

4) The expression $\frac{1}{1 + \sin x} + \frac{1}{1 - \sin x}$

is to be the left hand side of an equation that is an identity. Which one of the following four expressions can be used as the right hand side of the equation to complete the identity?

- A) $2 \sec^2 \theta$ B) $1 - \cos \theta$
 C) $\tan^2 \theta$ D) $3 \sec \theta$

Provide an appropriate response.

5) If, for some particular angle θ , $\sin \theta > 0$ and $\cos \theta < 0$, in what quadrant must θ lie? What is the sign of $\tan \theta$?

6) Is it correct to say that the value of $\cos 30 = \frac{\sqrt{3}}{2}$? Explain your answer.

7) Explain how the graph of $y = -\frac{1}{3} + \sin x$ can be obtained from the graph of $y = \sin x$.

8) A student writes " $\tan^2 + 1 = \sec^2$." Comment on this student's work.

9) Explain what is wrong with the following solution for the equation $\tan 2\theta = 2$ in the interval $[0, 2\pi)$.

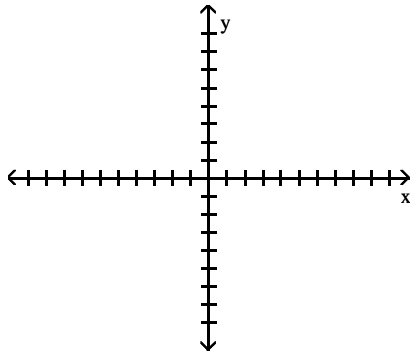
$$\tan 2\theta = 2$$

$$\tan \theta = 1$$

$$\theta = \frac{\pi}{4} \text{ or } \theta = \frac{5\pi}{4}$$

Sketch an angle θ in standard position such that θ has the smallest positive measure and the given point is on the terminal side of θ .

10) (3, 6)



Without using a calculator, decide which is greater.

11) $\cos 118^\circ$ or $\cos 119^\circ$

Evaluate the expression.

12) $\cot 270^\circ + 8 \cos 180^\circ + 5 \sec^2 360^\circ$

Find the measure of the third angle of a triangle if the measures of the other two angles are given.

13) 21° and 18°

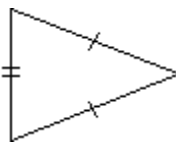
14) 50° and 90°

Identify the quadrant for the angle θ satisfying the following conditions.

15) $\tan \theta > 0$ and $\sin \theta < 0$

Classify the triangle as acute, right, or obtuse and classify it as equilateral, isosceles, or scalene.

16)



Find the exact function value if it exists.

17) $\csc (-120^\circ)$

Solve the problem. If necessary, round to the nearest tenth.

- 18) One airport has a ramp sloping down from the passenger waiting area to the plane. If the distance from the waiting area to the plane is 37 feet and the height from the ground to the waiting area is 7 feet, how long is the ramp?

The number represents an approximate measurement. State the range represented by the measurement.

19) 9.69 k

Find the exact value of the following expression without using a calculator.

20) $\sec (45^\circ)$

Solve the problem.

- 21) Bob is driving along a straight and level road straight toward a mountain. At some point on his trip he measures the angle of elevation to the top of the mountain and finds it to be $23^\circ 22'$. He then drives 1 mile (1 mile = 5280 ft) more and measures the angle of elevation to be $35^\circ 56'$. Find the height of the mountain to the nearest foot.

Solve.

- 22) An airplane travels at 200 km/h for 1 hr in a direction of 128° from Glenview Naval Air Station. At the end of this time, how far east of the Glenview Naval Air Station is the plane (to the nearest kilometer)?

Convert the radian measure to degrees. Round to the nearest hundredth if necessary.

23) $-\frac{\pi}{5}$

Find the exact circular function value.

24) $\cos 2\pi$

Solve the problem.

- 25) A wheel is rotating at 7 radians/sec, and the wheel has a 69-inch diameter. To the nearest foot, what is the speed of a point on the rim in ft/min?

Find the exact value of s in the given interval that has the given circular function value.

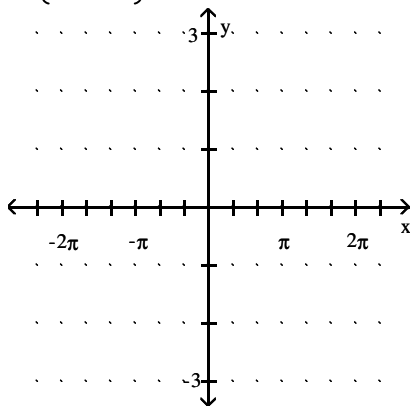
$$26) \left[\frac{\pi}{2}, \pi \right]; \cos s = -\frac{\sqrt{3}}{2}$$

Find the exact circular function value.

$$27) \cot \frac{-11\pi}{6}$$

Graph the function.

$$28) y = \csc \left(\frac{2}{3}x + \frac{\pi}{3} \right)$$

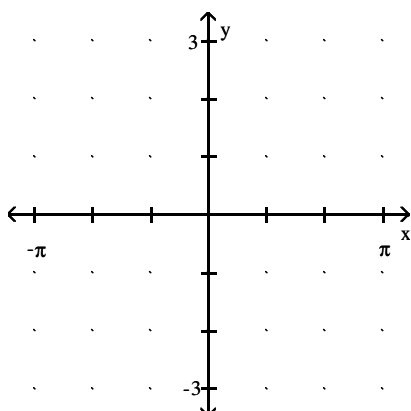


Find the phase shift of the graph of the function.

$$29) y = -5 \sin \left(x - \frac{\pi}{4} \right)$$

Graph the function.

$$30) y = \frac{1}{4} \tan 3x$$



Solve the problem.

- 31) For an electrical circuit, the voltage E is modeled by
 $E = 2.7 \cos 20\pi t$,
 where t is time measured in seconds. How many cycles are completed in one second?

Find the phase shift of the graph of the function.

$$32) y = 3 \cos \left(\frac{1}{4}x + \frac{\pi}{4} \right)$$

Solve the problem.

- 33) The power dissipated in an electric circuit is given by the expression $P = RI^2$, where R is the resistance of the circuit and I is the current through the circuit. For a sinusoidal alternating current, the current might be represented by the relation $I = A \sin(2\pi f t)$, where A is the amplitude, f is the frequency, and t is time. Write an expression for P involving the sine function, and use a fundamental identity to write P in terms of the cosine function.

Find the exact value of the expression using the provided information.

- 34) Find $\cos(B + C)$ given that $\sin B = -\frac{1}{2}$, with B in quadrant IV, and $\sin C = \frac{1}{4}$, with C in quadrant II.

Use an appropriate identity to find the exact value of the expression.

$$35) \cos \left(\frac{28\pi}{9} \right) \cos \left(\frac{\pi}{9} \right) + \sin \left(\frac{28\pi}{9} \right) \sin \left(\frac{\pi}{9} \right)$$

Use the fundamental identities to find the value of the trigonometric function.

- 36) Find $\sin s$ if $\sec s = -\frac{8}{5}$ and $\tan s < 0$.

Using a calculator, evaluate the expression.

$$37) \cot (-\arcsin \pi)$$

Solve the equation exactly over the interval $[0, 360^\circ)$.

$$38) \sin^2 \theta - \cos^2 \theta = 0$$

Solve the equation exactly over the interval $[0, 2\pi)$.

39) $\sin x = 1 - 2 \sin^2 x$

40) $\sin x \cos x = \frac{1}{2}$

Solve the problem.

41) A plane is heading due south with an airspeed of 239 mph. A wind from a direction of 53° is blowing at 10 mph. Find the bearing of the plane.

42) Two airplanes leave an airport at the same time, one going northwest at 414 mph and the other going east at 345 mph. How far apart are the planes after 4 hours (to the nearest mile)?

43) Starting at point A, a ship sails 53 km on a bearing of 190° , then turns and sails 18 km on a bearing of 280° . Find the distance of the ship from point A.

Perform the indicated operation. Write the result in standard form.

44) $(5 - 6i) + (1 - 3i)$

Answer the question.

45) In which quadrants do the nonreal cube roots of -1 lie?

Give an expression that generates all angles coterminal with the given angle. Let n represent any integer.

46) -232°

A is an angle in standard position and satisfies the given conditions. Find the indicated trigonometric function value of A . Do not use a calculator.

47) The terminal side of A is in quadrant IV and lies on the line $4x + 5y = 0$. Find $\cot A$.

Find the reference angle for the given angle.

48) $A = 380^\circ$

Solve the problem.

49) A fire is sighted due west of lookout A. The bearing of the fire from lookout B, 8.6 miles due south of A, is $N 42^\circ 26' W$. How far is the fire from B (to the nearest tenth of a mile)?

Find the value of s in the interval $[0, \pi/2]$ that makes the statement true.

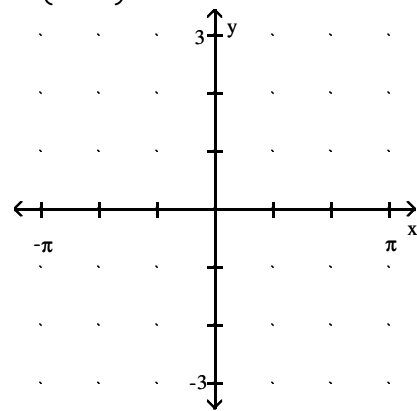
50) $\cos s = 0.90868542$

Use the formula $s = r\omega t$ to find the value of the missing variable.

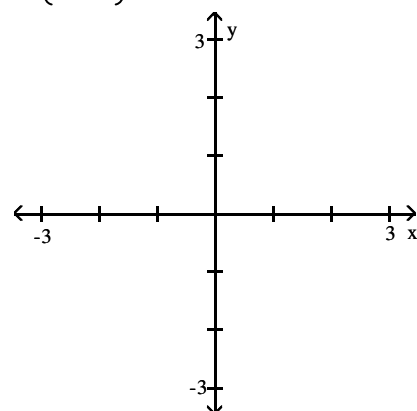
51) $s = 3.4$ m, $r = 9.177$ m, $\omega = 0.5602$ radians/sec

Graph the function.

52) $y = \csc \left(x - \frac{\pi}{5} \right)$



53) $y = \sin \left(x + \frac{\pi}{3} \right)$



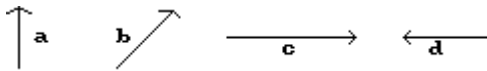
Find the exact value by using a half-angle identity.

54) $\tan 165^\circ$

Find the exact value of the real number y.

$$55) y = \sin^{-1}\left(-\frac{\sqrt{2}}{2}\right)$$

Draw a sketch to represent the vector. Refer to the vectors pictured here.



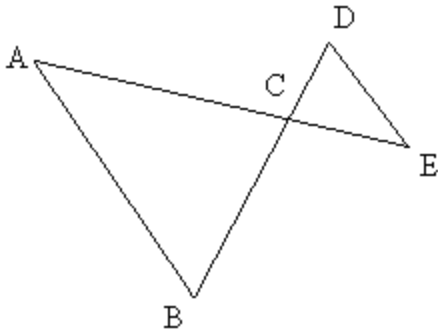
56) $-b$

Solve the equation.

$$57) x^2 - 6x + 34 = 0$$

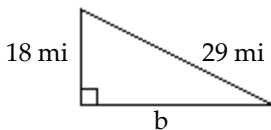
The triangles are similar. Find the angle or side that corresponds to the given angle or side in the other triangle.

58) AC
(AB is parallel to DE.)



Find the length of the third side of the right triangle.

59)



Find the exact circular function value.

60) $\cot \pi$

Find the specified quantity.

61) Find the amplitude of $y = 5 \sin(4x + \pi)$.

Find the exact value of the expression using the provided information.

62) Find $\cos(A + B)$ given that $\cos A = \frac{1}{3}$, with A in quadrant I, and $\sin B = -\frac{1}{2}$, with B in quadrant IV.

Solve the equation exactly over the interval $[0, 2\pi)$.

63) $\tan 2x - \tan x = 0$

Write the vector in the form $ai + bj$. Round a and b to 3 decimal places if necessary.

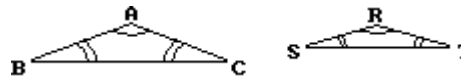
64) $\langle -8, 2 \rangle$

Find the product. Write the answer in standard form.

65) $(5 - 5i)(4 + 9i)$

The triangles are similar. Find the angle or side that corresponds to the given angle or side in the other triangle.

66) BC



Find all values of θ , if θ is in the interval $[0, 360^\circ)$ and has the given function value.

67) $\tan \theta = 1$

Convert the degree measure to radians, correct to four decimal places. Use 3.1416 for π .

68) 56.39°

Decide whether the statement is true or false.

69) $\sin 44^\circ > \sin 26^\circ$

Tell whether the statement is true or false.

70) $\cos \frac{\pi}{72} = \cos \frac{\pi}{9} \cos \frac{\pi}{8} - \sin \frac{\pi}{9} \sin \frac{\pi}{8}$

Provide an appropriate response.

71) True or False? The domain of $y = \arccos x$ equals the range of $y = \cos x$.

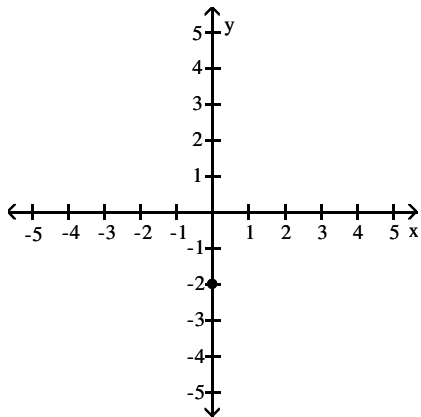
72) True or false? The parametric equations $x = 2 \tan t$, $y = 3 \sec t$ will graph a parabola.

Decide whether the statement is true or false.

73) $\tan 19^\circ > \cot 19^\circ$

Give the rectangular form of the complex number whose terminal point is represented in the graph.

74)



Find the resultant (sum) of the complex numbers. Express in rectangular form $a + bi$.

75) $-6 - 5i, -3i$

Write the complex number in rectangular form.

76) $\sqrt{6}(\cos 315^\circ + i \sin 315^\circ)$

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

Write the complex number in trigonometric form $r(\cos \theta + i \sin \theta)$, with θ in the interval $[0^\circ, 360^\circ)$.

78) -5

Perform the conversion, using a calculator as necessary.

79) Convert $5 + 2i$ to trigonometric form.

Find the product. Write the product in rectangular form, using exact values.

80) $[\sqrt{6}(\cos 150^\circ + i \sin 150^\circ)] [\sqrt{6}(\cos 90^\circ + i \sin 90^\circ)]$

Find the following quotient, and write the quotient in rectangular form, using exact values.

81) $\frac{8(\cos 90^\circ + i \sin 90^\circ)}{3(\cos 30^\circ + i \sin 30^\circ)}$

Convert to trigonometric form and find the quotient. Write your answer in rectangular form.

82) $\frac{2\sqrt{3} + 2i}{\sqrt{3} - i}$

Find the given power. Write your answer in rectangular form. Give your answer in exact form unless otherwise specified.

83) $(1 + i)^{20}$

Find all cube roots of the complex number. Leave your answer in trigonometric form.

84) -125

Find all specified roots. Give your answer in trigonometric form.

85) Fifth roots of i
Give your answer in trigonometric form with angles in degrees.

Find all specified roots. Give your answer in rectangular form.

86) Cube roots of 1 .

Find all solutions of the equation. Leave answers in trigonometric form.

87) $x^2 - 36 = 0$

Answer Key

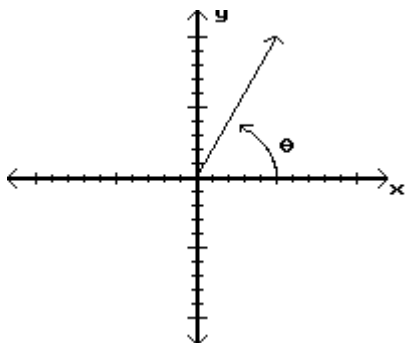
Testname: PRACFIN

- 1) D
- 2) B
- 3) C
- 4) A
- 5) II; negative
- 6) No, it is not correct because $\cos 30$ means the cosine of 30 radians, not the cosine of 30 degrees. It would be correct to say that the value of $\cos 30^\circ = \frac{\sqrt{3}}{2}$.

7) The graph of $y = \sin x$ is shifted $\frac{1}{3}$ unit(s) downward to obtain the graph of $y = -\frac{1}{3} + \sin x$.

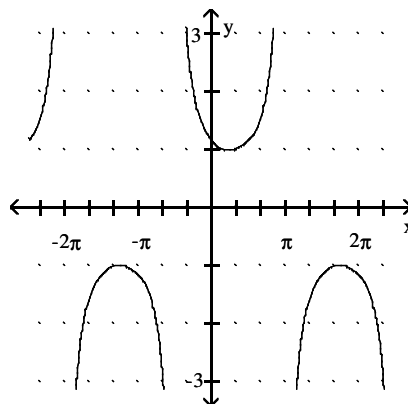
- 8) Answers will vary
- 9) Answers will vary. $\tan 2\theta \neq 2 \tan \theta$, so the first equation cannot be divided by 2.

10)



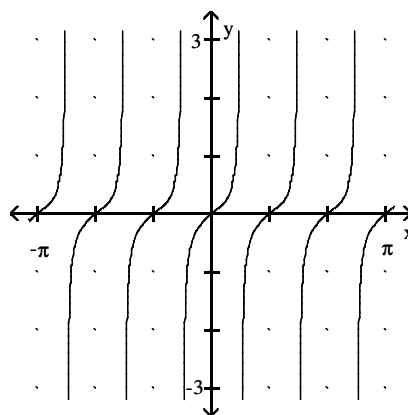
- 11) $\cos 118^\circ$
- 12) -3
- 13) 141°
- 14) 40°
- 15) Quadrant III
- 16) Acute, isosceles
- 17) $-\frac{2\sqrt{3}}{3}$
- 18) About 37.7 ft
- 19) 9.685 kg to 9.695 kg
- 20) $\sqrt{2}$
- 21) 5648 ft
- 22) 158
- 23) -36°
- 24) 1
- 25) 1208 ft/min
- 26) $s = \frac{5\pi}{6}$
- 27) $\sqrt{3}$

28)



29) $\frac{\pi}{4}$ units to the right

30)



- 31) 10 cycles
- 32) π units to the left
- 33) $P = RA^2 \sin^2(2\pi f t)$; $P = RA^2 - RA^2 \cos^2(2\pi f t)$
- 34) $\frac{1 - 3\sqrt{5}}{8}$
- 35) -1
- 36) $\frac{\sqrt{39}}{8}$
- 37) Undefined
- 38) $\{45^\circ, 135^\circ, 225^\circ, 315^\circ\}$
- 39) $\left\{\frac{\pi}{6}, \frac{5\pi}{6}, \frac{3\pi}{2}\right\}$
- 40) $\left\{\frac{\pi}{4}, \frac{5\pi}{4}\right\}$
- 41) 182°
- 42) 2807 mi
- 43) 56 km
- 44) $6 - 9i$
- 45) The first and fourth quadrants
- 46) $-232^\circ + n \cdot 360^\circ$

Answer Key

Testname: PRACFIN

47) $-\frac{5}{4}$

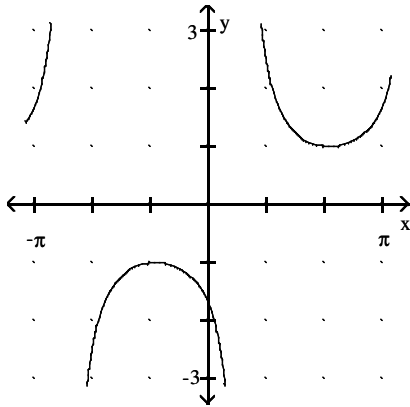
48) 20°

49) 11.7 mi

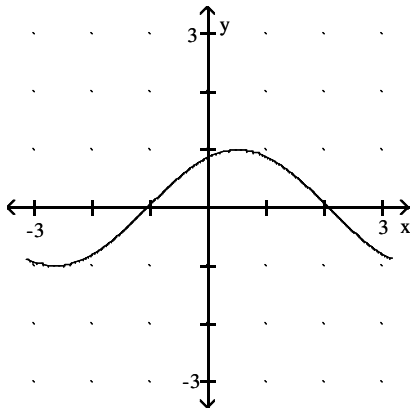
50) 0.43067197

51) $t = 0.6614$ sec

52)



53)



54) $-2 + \sqrt{3}$

55) $-\frac{\pi}{4}$

56)



57) $3 \pm 5i$

58) EC

59) $b = \sqrt{517}$ mi; $b \approx 22$ mi

60) Undefined

61) 5

62) $\frac{\sqrt{3} + 2\sqrt{2}}{6}$

63) $\{0, \pi\}$

64) $-8\mathbf{i} + 2\mathbf{j}$

65) $65 + 25i$

66) ST

67) 45° and 225°

68) 0.9842

69) TRUE

70) FALSE

71) TRUE

72) FALSE

73) FALSE

74) $-2i$

75) $-6 - 8i$

76) $\sqrt{3} - \sqrt{3}i$

77) $\frac{\sqrt{3}}{2} + \frac{3}{2}i$

78) $5(\cos 180^\circ + i \sin 180^\circ)$

79) $\sqrt{29}(\cos 21.80^\circ + i \sin 21.80^\circ)$

80) $-3 - 3\sqrt{3}i$

81) $\frac{4}{3} + \frac{4\sqrt{3}}{3}i$

82) $1 + \sqrt{3}i$

83) -1024

84) $5 \text{ cis } 60^\circ, 5 \text{ cis } 180^\circ, 5 \text{ cis } 300^\circ$

85) $\cos 18^\circ + i \sin 18^\circ, \cos 90^\circ + i \sin 90^\circ, \cos 162^\circ + i \sin 162^\circ, \cos 234^\circ + i \sin 234^\circ, \cos 306^\circ + i \sin 306^\circ$

86) $1, -\frac{1}{2} + \frac{\sqrt{3}}{2}i, -\frac{1}{2} - \frac{\sqrt{3}}{2}i$

87) $6 \text{ cis } 180^\circ, 6 \text{ cis } 0^\circ$