

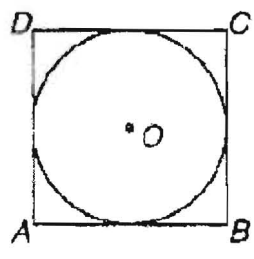
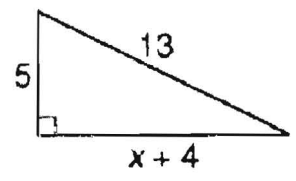
If n is of the form a^2 and a is an integer, which of the following **MUST** be an odd integer?

ROSSVIEW AP Calculus summer assignment

- (A) $n + 1$
- (B) $n + 2$
- (C) $2n + 1$
- (D) $3n$
- 1 (E) $3n + 1$

Express $2b$ in terms of a

2. If $\frac{a}{b+1} = 2$, what does $2b$ equal?



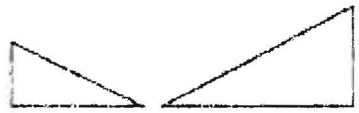
3. What is the value of x in the diagram above?

4. Circle O above is inscribed inside square $ABCD$. If the area of the circle is 9π , what is the perimeter of the square?

"Some marbles in the bag are green."

If the statement above is true, which of the following must also be true?

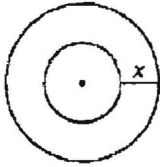
- (A) If a marble is in the bag, it is green.
- (B) If a marble is green, it is in the bag.
- (C) Some marbles in the bag are red.
- (D) Some marbles in the bag are not red.
- 5. (E) There are more green marbles in the bag than any other color.



6. The triangles above are similar. If the areas of the two triangles are 16 and 36 respectively, what is the ratio of their perimeters?

7. If $f(x) = \frac{1}{2}x - c$ and $f(8) = 6$, what is the value of c ?

8. If $(3^{\frac{1}{n}})^{-8} = 3$, what is the value of n ?



If the circumference of the larger circle above is 10π , and the circumference of the smaller circle is 6π , what is the value of x ?

9.

10 (E) (4, 8)

if a circle with radius 5 has its center at the point $(-1, 3)$, which of the following points is on the circle?

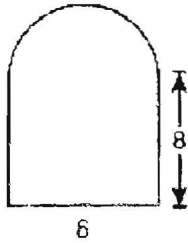
(A) $(-6, -2)$

(B) $(-1, -2)$

(C) $(-4, 8)$

(D) $(6, 3)$

Give an exact answer in terms of π



The shape above was made by connecting a semicircle to a rectangle. What is the perimeter of the shape?

11.

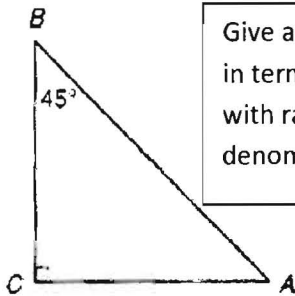
12. If $x + y = 1.2$, then $x^2 + 2xy + y^2 =$

13. If $a \Phi b = \frac{a+b}{a-b}$, then $\frac{1}{2} \Phi 1 = ?$

14. $y = 2x + 7$

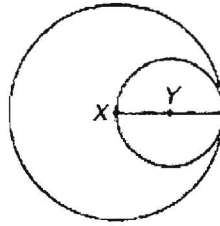
What is the value of a so that the line that passes through the points $(a, 7)$ and $(5, 4)$ is perpendicular to the line

Must show work on paper: do fractions without calculator



15. The ratio $AB : BC$ equals

Give an exact answer in terms of radicals with rational denominator

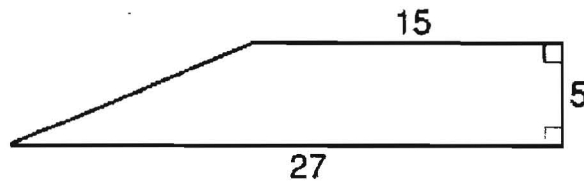


The diameter of $\odot X$ above is 40 inches. What is the ratio of the area of $\odot Y$ to the area of $\odot X$?

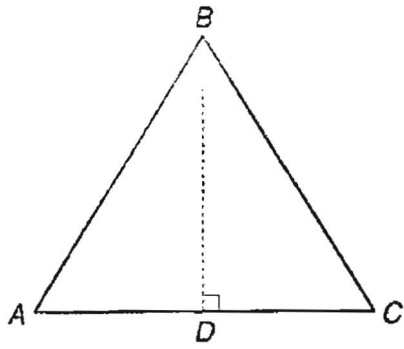
16.

Ramon can paint a fence in two hours. Jenny can paint the same fence 15 minutes faster than Ramon and Dennis can paint it in half Ramon's time. About how many minutes will it take to paint the fence if all three people work together?

17.



18. What is the perimeter of the trapezoid shown above?



Give an exact answer
in terms of radicals
with rational
denominator

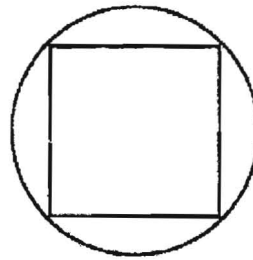
The slope of \overline{AB} is $\frac{2}{5}$, the slope of \overline{BC} is $-\frac{2}{5}$, and the length of \overline{AC} is 20. What is

19) the length of \overline{BD} ?

Which of the following is the same as

20) $\frac{1}{\sqrt{4x}} + \frac{\sqrt{x}}{2}$?

21. Mike can cut a 40 foot by 20 foot yard with a push mower in 25 minutes. At this rate, how many more minutes would it take him to cut a 40 foot by 30 foot yard?



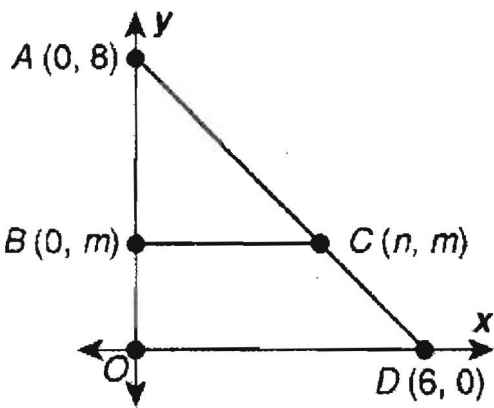
22. What is the ratio of the area of the square to the area of the circle if the length of a side of the square is 10 units?

23 $\log\left(\frac{1}{10^a}\right) = ?$ express in terms of a

24 $4x^3 + 12x^2 + 9x + 27 = 0$ find all three roots including imaginary

25 A sphere is inscribed inside a cube. What is that probability that a point that is inside the cube is also inside the sphere?

26 Solve for x: $\sqrt{ax + 1} - \sqrt{ax - 1} = \sqrt{ax}$. express x in terms of a



Find the value of m so that the area of the triangle ABC equals the area of trapezoid $OBCD$

27

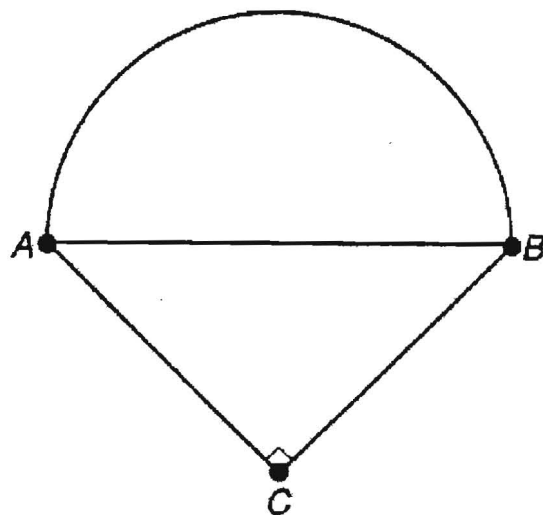
Points A and C lie on a straight road and point B lies directly above the road. The angle of elevation from point A to point B is 35° and the angle of depression from point B to point C is 35° . If the distance from A to C is 20 miles, approximately how many miles above the road is point B ?

Express answer rounded to hundredths of a mile

28

If $\frac{2x - 3}{3x^2 + 16x + 5} + A =$

29 $\frac{3x^2 + 3x + 18}{3x^3 + 13x^2 - 11x - 5}$, then $A =$



30 The figure shows a semicircle on top of an isosceles right triangle. If the length of \overline{AB} is 16π , what is the approximate length of \overline{BC} ?

31 If $g(x) = \frac{5x - 3}{2x^2 - 11 - 6}$, what is the sum of all the real numbers that are not in the domain of $g(x)$?

The zeros of $m(x) = \frac{x^2 + 3x + 2}{x^2 - 3x + 2}$ are the first two terms of a sequence. Each term in the sequence is found by adding the two terms before it. If each term is smaller than the one before it, what is the fifth term of the sequence?

32

What is an equation of the circle that has its center at the origin and is tangent to the line $y = -3x + 7$?

33

If $h(x) = (f \circ g)(x)$ and $h^{-1}(x)$ is the inverse of $h(x)$, then which of the following must be equal to x ?

(A) $(h^{-1} \circ f \circ g)(x)$

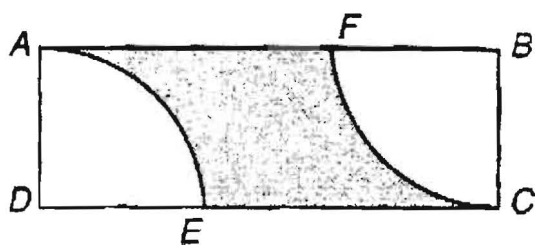
(B) $(h^{-1} \circ g \circ f)(x)$

(C) $(f^{-1} \circ g^{-1} \circ h^{-1})(x)$

34 (D) $(g^{-1} \circ f^{-1} \circ h^{-1})(x)$

Figure $ABCD$ is a rectangle whose length is twice its width. \widehat{FC} and \widehat{AE} are arcs of circles centered at B and D respectively. If the length of \overline{AD} is x , then the area of the shade region is

35



36

37. If $3x - 2 = y$, what is $y^2 + 6$?

The length of the base of a certain television screen is 50 inches and it makes a 35° angle with the diagonal of the screen. Approximately how long, in inches, is the diagonal?

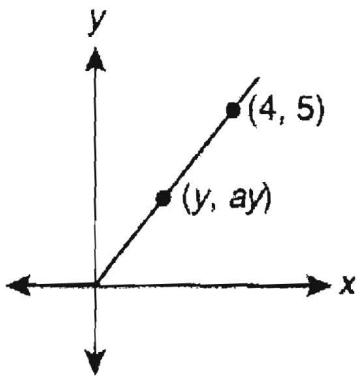
38

39 For what values of x is $|2x + 1| + 3 < 8$?

40 If $4m^2 + 9n^2 = 1$ and $(2m - 3n)^2 = 13$, what is the value of mn ?

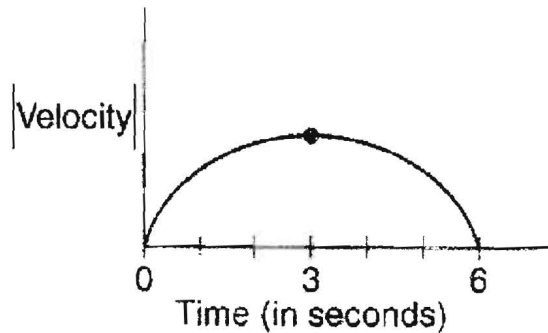
A tree fell over and is now leaning against the top of Mrs. Collini's house. The height of the house is 20 meters and the base of the tree is 35 meters from the base of the house. What angle does the fallen tree make with the ground, rounded to the nearest degree?

40 Find $f(3)$ if $f(x) = \begin{cases} 2 - x, & \text{if } x > 3 \\ x + 2, & \text{if } x \leq 3 \end{cases}$ 41



42 find a

Remember that the absolute value (magnitude) of velocity is speed. Give the intervals where the speed is increasing, decreasing, and the point where the speed is maximum.



43 A car is traveling on a straight road. Its velocity versus time is shown on the graph.

44. If $5x - 6 = 3(y - 2)$, then $5\left(\frac{x}{y}\right)$ is 45 if $\sin\left(x - \frac{\pi}{2}\right) = a$ find $\cos(x)$ in terms of a.

What is the range, in interval notation, of the piecewise function?

45 $g(x) = \begin{cases} -3x + 5, & \text{if } -4 \leq x \leq 0 \\ 3x + 6, & \text{if } 0 < x \leq 4 \end{cases}$

If $\sin(ax) = 0.3\cos(ax)$, x is in radians,

$-\frac{\pi}{2} < x < \frac{\pi}{2}$, and $a > 1$, then $x =$

46. Express in terms of a . round to 2 decimal places

47 Line A has the equation $2x + 3y = 7$. If line B is perpendicular to line A at $x = 2$, where does line B intersect the x-axis?

48 The function $f(x)$ has the following values: $f(1) = 2$, $f(2) = 5$, $f(5) = 8$, and $f(8) = 10$. If $f^{-1}(x)$ is the inverse of $f(x)$, then $f^{-1}(5) =$

If a and b are greater than 0, then

49 $\sin(\arctan \frac{a}{b}) =$

express in terms of a and b

If $f(x) = -a\sin(bx + c) + d$ and
 $a, b, c, d > 0$, what is the range of $f(x)$

50. in interval notation?

express in terms of $a, b, c,$ and or d

x	y
-3	0
-2	1
-1	1.5
0	1
1	3
2	4

Let $f(x)$ be the equation of the line-of-best-fit used to approximate the data given in the chart. What is the approximate value of $f(5)$?

51.

52. Let $f(x)$ be the exponential regression equation for the data table below.

Use a graphing calculator to find the regression equation." Stat button "edit "enter". Put numbers in L1 and L2. " Stat button" over to "calc" down to expreg "enter" NOW before you hit enter again. "VARS button(by clear)" over to "y vars" over to "function" Y1"enter"

Screen should look like

ExpRegY1

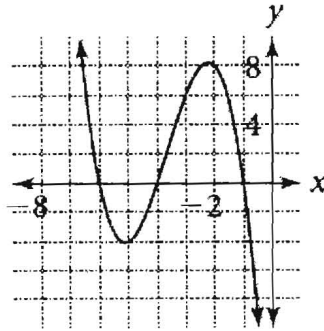
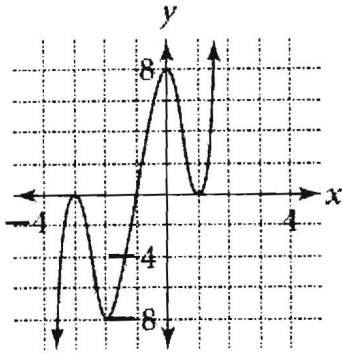
Hit enter.

This automatically puts the equation into "y=" . Now go to TBLSET ("2nd window" and change the ΔTbl to 0.1. Now hit "2nd graph"(TABLE) to see a table of values. Use this table to answer the questions below.

Years past 1980	# of computers in USA
0	23000
5	103500
10	527850
15	2216970
20	12415032
25	48418625

What is the meaning of $f(12)$? Explain in a short sentence. Give the numerical value for $f(12)$.

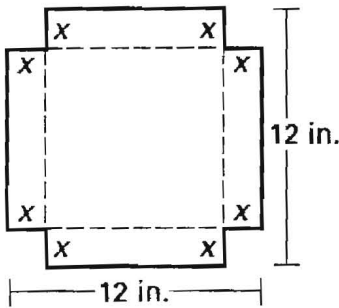
What is the meaning of $f^{-1}(316742)$? Explain in a short sentence. Give the numerical value for $f^{-1}(316742)$



For each of the graphs to the left, express a polynomial in order of decreasing exponents that closely matches the graph in terms of intercepts, maxima, and minima. List local maxima, minima, and intervals where the function is increasing and decreasing.

53

The corners of a square piece of cardboard are cut out and the sides folded up to form an open box as shown in the figure below.



Let $f(x)$ be a function that gives the volume of the box shown and described to the left. Give the range of $f(x)$

54

55 Solve the equation $be^{ax} \cdot e^c = 1$ for x .

56. Find the reference angle for $x = \frac{53\pi}{3}$. Find the x and y coordinates of the point on the unit circle associated with x . an angle on the interval $(0, 2\pi]$ that is coterminal with x . Evaluate all six trig functions for x . Express answers exactly using radicals.

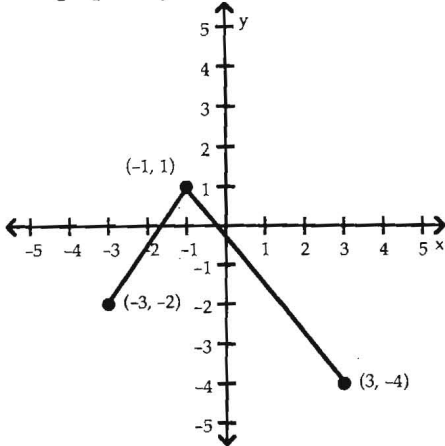
57 On the interval $[-\frac{7\pi}{2}, -\frac{3\pi}{2})$, find all sub-intervals for which the function $f(x) = \sin(4x)$ is decreasing.

Solve the problem.

57) The graph of $y = x^2$ is shifted to the right by 3 units. Write the resulting equation.

Using transformations, sketch the graph of the function.

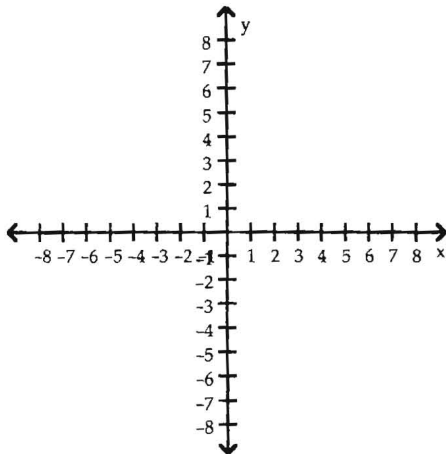
58) The graph of $y = f(x)$ is as shown. Sketch the graph of $y = f(x + 2) - 1$



Graph the function.

59) Graph the function whose graph is that of $y = x^3 - x^2 - 6x$ but is reflected about the y-axis.

59



Find the domain of the composite function $f \circ g$. "give THE COMPOSITE FUNCTION"

60) $f(x) = 6x + 54$; $g(x) = x + 1$

61) $f(x) = \frac{8}{x+8}$; $g(x) = x + 5$

62) $f(x) = \sqrt{x-1}$; $g(x) = \frac{1}{x-6}$

FOR 60-62

Solve the problem.

63) An oil well off the Gulf Coast is leaking, with the leak spreading oil over the surface of the gulf as a circle. At any time t , in minutes, after the beginning of the leak, the radius of the oil slick on the surface is $r(t) = 6t$ ft. Find the area A of the oil slick as a function of time.

64) Let $f(x) = \sqrt{2-x}$ and $g(x) = |2x-1|$. Find the domain of $(f \circ g)(x)$. Express answer in interval notation.

65) Let $g(x) = \frac{x-1}{x+2}$ and $h(x) = 4x-3$. Find $(h \circ g)(x)$. Express answer as a single fraction in reduced form.

Find functions f and g so that the composition of f and g is H .

66) $H(x) = \sqrt[3]{x+1}$

Solve the problem.

- 67) A wire of length $6x$ is bent into the shape of a square. Express the area of the square as a function of x .
- 68) Two boats leave a dock at the same time. One boat is headed directly east at a constant speed of 35 knots (nautical miles per hour), and the other is headed directly south at a constant speed of 22 knots. Express the distance d between the boats as a function of the time t .
- 69) An open box with a square base is required to have a volume of 27 cubic feet. Express the amount A of material used to make such a box as a function of the length x of a side of the base.
- 70) Let $P(x, y)$ be a point on the graph of $y^2 = 4x + 4$. Express the distance, d , of the point P from the origin. Express your answer in a simplified form.

In the problem, t is a real number and $P=(x,y)$ is the point on the unit circle that corresponds to t . Find the exact value of the given trigonometric function.

71) $\left(\frac{5}{6}, \frac{\sqrt{11}}{6}\right)$; find $\sin t$

72) $\left(\frac{5}{6}, \frac{\sqrt{11}}{6}\right)$; find $\tan t$

73) $\left(\frac{\sqrt{55}}{8}, \frac{3}{8}\right)$; find $\sec t$

74) $\left(-\frac{\sqrt{33}}{7}, \frac{4}{7}\right)$; find $\cos t$

75) $\left(-\frac{\sqrt{65}}{9}, \frac{4}{9}\right)$; find $\cot t$

A point on the terminal side of angle θ is given. Find the exact value of the given trigonometric function.

76) (12, 16); Find $\sin \theta$.

77) (6, 8); Find $\cos \theta$.

78) (-15, 36); Find $\sin \theta$.

79) (21, 28); Find $\csc \theta$.

Find the value of the expression.

80) $\sin^{-1} \frac{\sqrt{2}}{2}$

81) $\cos^{-1} \frac{\sqrt{2}}{2}$

82) $\cos^{-1} \left(-\frac{\sqrt{2}}{2}\right)$

83) $\tan^{-1} -1$

84) $\sin^{-1} -0.5$

85) $\tan^{-1} \left(\frac{\sqrt{3}}{3}\right)$

Use a calculator to find the value of the expression in radian measure rounded to 2 decimal places.

86) $\sin^{-1}(0.4)$

87) $\cos^{-1} \left(\frac{1}{6}\right)$

88) $\tan^{-1}(1.5)$

89) $\sin^{-1} \left(\frac{\sqrt{5}}{3}\right)$

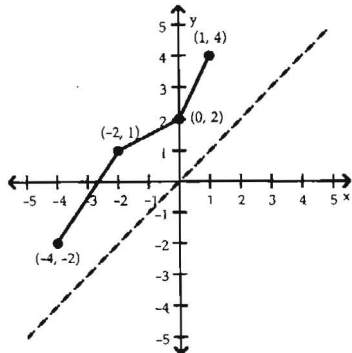
Solve the problem.

- 90) A building 150 feet tall casts a 80 foot long shadow. If a person looks down from the top of the building, what is the measure of the angle between the end of the shadow and the vertical side of the building (to the nearest degree)? (Assume the person's eyes are level with the top of the building.)

- 91) Two surveyors 180 meters apart on the same side of a river measure their respective angles to a point on the other side of the river and obtain 54° and 68° . How far from the point (line-of-sight distance) is each surveyor? Round your answer to the nearest 0.1 meter.
- 92) A hill slopes at an angle of 15° with the horizontal. From the base of the hill, the angle of elevation of a 600 ft tower at the top of the hill is 40° . How much rope would be required to reach from the top of the tower to the bottom of the hill? Round answer to the nearest foot.
- 93) A room in the shape of a triangle has sides of length 7 yd, 10 yd, and 15 yd. If carpeting costs \$18.50 a square yard and padding costs \$4.25 a square yard, how much to the nearest dollar will it cost to carpet the room, assuming that there is no waste?

Use the graph of the given one-to-one function to sketch the graph of the inverse function. For convenience, the graph of $y = x$ is also given.

94)



MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

The function f is one-to-one. Find its inverse.

95) Determine the equation for the inverse function of $y = (x + 2)^3 - 8$.

A) $y = \sqrt[3]{x+8} - 2$

B) $y = \sqrt[3]{x-2} + 8$

C) $y = \sqrt[3]{x+10}$

D) $y = \sqrt[3]{x+6}$

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Solve the problem.

96) A rumor is spread at an elementary school with 1200 students according to the model $N = 1200(1 - e^{-0.16d})$ where N is the number of students who have heard the rumor and d is the number of days that have elapsed since the rumor began. How many students will have heard the rumor after 5 days?

Write the logarithmic expression as a sum and difference of logarithms.

97) $\log_a \frac{x^4 \sqrt[3]{x+5}}{(x-2)^2}$

Use the Change-of-Base Formula and a calculator to evaluate the logarithm. Round your answer to two decimal places.

98) Evaluate $\log_{(2/3)} 19$.

Use the Change-of-Base Formula and a calculator to evaluate the logarithm. Round your answer to three decimal places.

99) $\log_5 50.48$

Solve the equation.

100) $\log_2 x = 5$

101) $\log 4x = \log 2 + \log (x - 1)$

102) $\log (3 + x) - \log (x - 4) = \log 2$

Solve the given logarithmic equation.

103) $\log_2(3x - 2) - \log_2(x - 5) = 4$

104) $2 + \log_3(2x + 5) - \log_3 x = 4$

Solve the equation. If necessary, round your answer to two decimal places.

105) $3^x = 27$

106) $4(1 + 2x) = 64$

107) $\left(\frac{1}{4}\right)^x = 14$

108) $4(2x - 1) = 16$

Solve the given exponential equation.

109) $3 \cdot 5^{2t} - 1 = 75$

Find the present value.

110) How much money need to be invested now to get \$2000 after 4 years at 8% compounded quarterly? Express your answer to the nearest dollar.

Solve the problem.

111) A culture of bacteria obeys the law of uninhibited growth. If 140,000 bacteria are present initially and there are 609,000 after 6 hours, how long will it take for the population to reach one million?

112) The half-life of silicon-32 is 710 years. If 40 grams is present now, how much will be present in 200 years? (Round your answer to three decimal places.)

113) A fossilized leaf contains 14% of its normal amount of carbon 14. How old is the fossil (to the nearest year)? Use 5600 years as the half-life of carbon 14.

114) The logistic growth model $P(t) = \frac{1240}{1 + 40.33e^{-0.325t}}$ represents the population of a bacterium in a culture tube after t hours. What was the initial amount of bacteria in the population?

115) The logistic growth model $P(t) = \frac{180}{1 + 44e^{-0.188t}}$ represents the population of a species introduced into a new territory after t years. When will the population be 80?

Use the fact that the trigonometric functions are periodic to find the exact value of the expression.

116) $\cos \frac{10\pi}{3}$

Give the amplitude or period as requested.

117) Amplitude of $y = 4 \sin x$

118) Amplitude of $y = -3 \sin 5x$

119) Period of $y = \sin 5x$

120) Period of $y = -5 \cos \frac{1}{2}x$

121) Period of $y = \frac{5}{4} \sin \left(-\frac{4\pi}{7}x \right)$

Use the fact that the trigonometric functions are periodic to find the exact value of the expression.

122) $\sin 765^\circ$

123) $\sin \frac{10\pi}{3}$

124) $\tan 390^\circ$

125) $\tan \frac{13\pi}{4}$

126) $\csc 660^\circ$

127) $\sec \frac{13\pi}{4}$

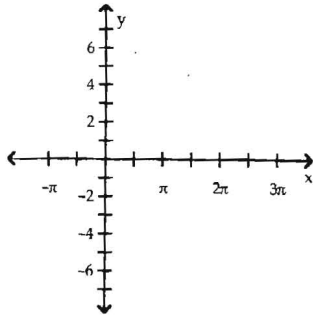
128) $\cot 570^\circ$

Find the amplitude, period, and phase shift of the sinusoidal function.

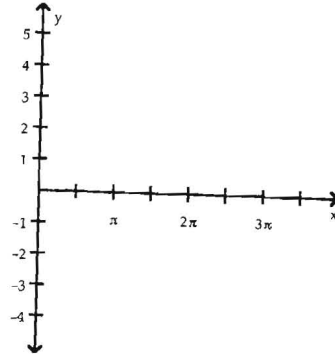
$$129) y = -\frac{3}{4} \sin\left(\frac{1}{4}x + \frac{\pi}{2}\right)$$

Graph the function. Show at least one period.

$$130) y = 2\cos\left(3x + \frac{\pi}{2}\right)$$



$$131) y = 3 \sin\left(\frac{1}{2}x + \frac{\pi}{4}\right)$$



Use a calculator to find the value of the expression in radian measure rounded to 2 decimal places.

$$132) \csc^{-1}\left(\frac{7}{2}\right)$$

$$133) \sec^{-1}\left(-\frac{8}{5}\right)$$

$$134) \cot^{-1}\left(-\frac{2}{3}\right)$$

Using a calculator, approximate the value of the expression. Round answer to three decimal places.

$$135) \sec^{-1}\left(-\frac{7}{3}\right)$$

Simplify the expression as far as possible.

$$136) \frac{\cos \theta}{1 + \sin \theta} + \tan \theta$$

$$137) (1 + \cot \theta)(1 - \cot \theta) - \csc^2 \theta$$

Solve the equation for solutions in the interval $0 \leq \theta < 2\pi$.

$$138) \sin 4\theta = \frac{\sqrt{3}}{2}$$

$$139) \sqrt{2} \cos 2\theta = 1$$

$$140) 5 \csc \theta - 2 = 3$$

Use a calculator to solve the equation on the interval $0 \leq \theta < 2\pi$. Round the answer to two decimal places.

$$141) \tan \theta = 3.7$$