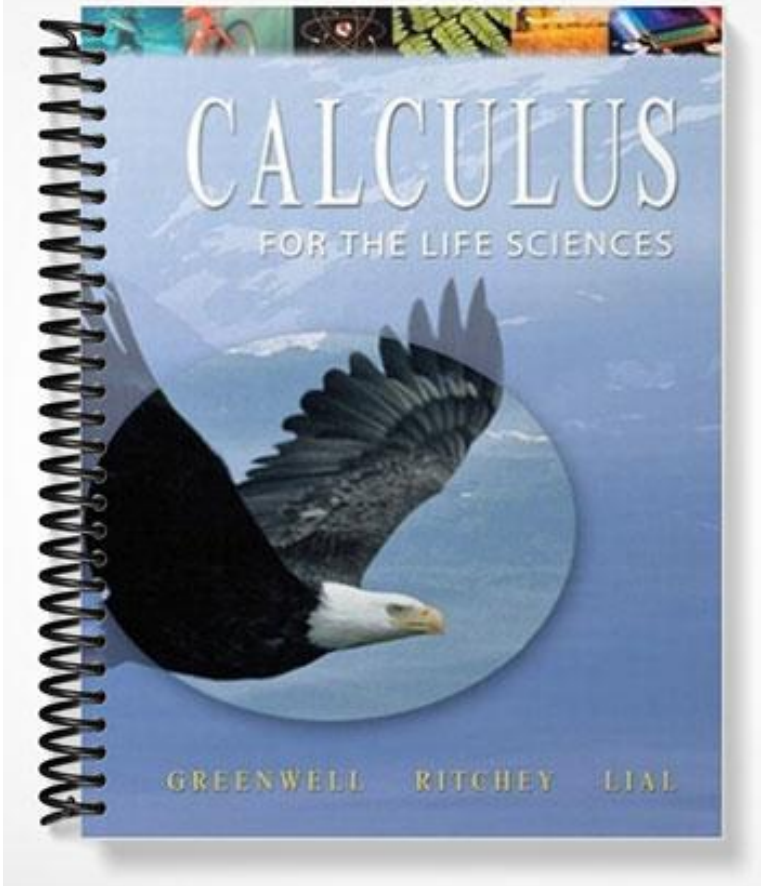
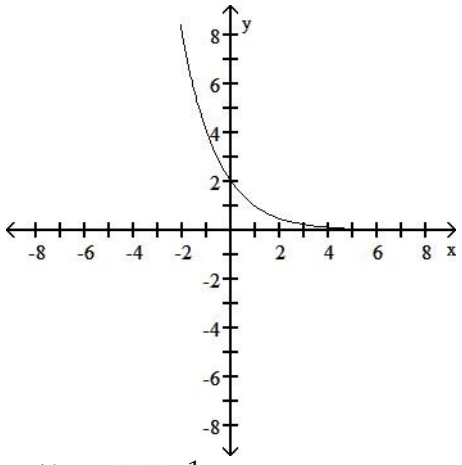
TEST BANK



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

Match the graph to the function.

1) 1) _____



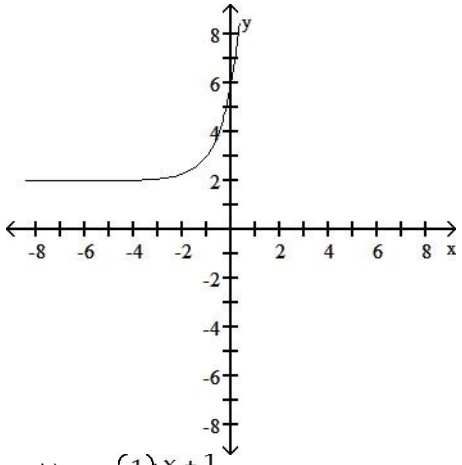
A) $y = 2^{-x} - 1$

B) $y = \left(\frac{1}{2}\right)^{x} - 1$

C) $y = 2^{x} + 1$

D) $y = \left(\frac{1}{2}\right)^{1 - x}$

2) 2) _____



A) $y = \left(\frac{1}{4}\right)^{x + 1} + 2$

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

C) $y = 4^{x - 1} + 2$

D) $y = 4^{x + 1} + 2$

Solve the equation.

3) $5^x = 25$ 3) _____

A) 1 B) 5 C) 3 D) 2

4) $2^{-x} = \frac{1}{16}$ 4) _____

A) 4 B) -4 C) $\frac{1}{4}$ D) $\frac{1}{8}$

5) $3(12 - 3x) = 729$ 5) _____

A) -2 B) 243 C) 2 D) 4

6) $3(1 + 2x) = 27$ 6) _____

A) -1 B) 1 C) 3 D) 9

7) $2(5 - 3x) = \frac{1}{16}$ 7) _____

A) $\frac{1}{8}$ B) 3 C) 8 D) -3

8) $2^x = \frac{1}{16}$ 8) _____

A) -4 B) $\frac{1}{8}$ C) $\frac{1}{4}$ D) 4

9) $4(7 + 3x) = \frac{1}{16}$ 9) _____

A) $\frac{1}{4}$ B) 4 C) 3 D) -3

10) $e^{-4x} = (e^6)^{3-x}$ 10) _____

A) $\frac{3}{2}$ B) 0 C) $\ln(9)$ D) 9

11) $2^{-|x|} = \frac{1}{8}$ 11) _____

A) ± 3 B) ± 1 C) 3 D) ± 2

Solve the problem.

12) Use the formula $P = Ie^{kt}$. A bacterial culture has an initial population of 1000. If its population grows to 3000 in 4 hours, what will it be at the end of 6 hours? 12) _____

A) 4311 B) 5196 C) 42,128 D) 164,317

13) Use the formula $P = Ie^{kt}$. A bacterial culture has an initial population of 500. If its population grows to 5000 in 2 hours, what will it be at the end of 4 hours? 13) _____

A) 23 B) 1256 C) 50,000 D) 6,250,000

14) Use the formula $P = Ie^{kt}$. A bacterial culture has an initial population of 10,000. If its population declines to 7000 in 8 hours, what will it be at the end of 10 hours? 14) _____

A) 3202 B) 6652 C) 6403 D) 1500

15) The population of a particular city is increasing at a rate proportional to its size. It follows the function $P(t) = 1 + ke^{0.06t}$ where k is a constant and t is the time in years. If the current population is 37,000, in how many years is the population expected to be 92,500? 15) _____

A) 7 years(s) B) 104 year(s)

C) 8 year(s) D) 15 year(s)

16) The number of dislocated electric impulses per cubic inch in a transformer increases when lightning strikes by $D = 6700(3)^x$, where x is the time in milliseconds of the lightning strike. Find the number of dislocated impulses at x = 0 and x = 2. 16) _____

A) 6700, 60,300 B) 20,100, 60,300
C) 6700, 180,900 D) 6700, 40,200

17) The number of bacteria growing in an incubation culture increases with time according to $B = 3100(5)^x$, where x is time in days. Find the number of bacteria when x = 0 and x = 4. 17) _____

A) 3100 bacteria, 1,937,500 bacteria
B) 3100 bacteria, 9,687,500 bacteria
C) 15,500 bacteria, 1,937,500 bacteria
D) 3100 bacteria, 62,000 bacteria

Write the exponential equation in logarithmic form.

18) $52 = 25$ 18) _____

A) $\log 5\ 25 = 2$ B) $\log 5\ 2 = 25$
C) $\log 25\ 5 = 2$ D) $\log 2\ 25 = 5$

19) $42 = 16$ 19) _____

A) $\log 4\ 16 = 2$ B) $\log 4\ 2 = 16$
C) $\log 2\ 16 = 4$ D) $\log 16\ 4 = 2$

20) $5^{-3} = \frac{1}{125}$ 20) _____

A) $\log_{-3} \frac{1}{125} = 5$ B) $\log 5^{\frac{1}{125}} = -3$
C) $\log_{1/125}\ 5 = -3$ D) $\log 5\ -3 = \frac{1}{125}$

21) $\left(\frac{3}{8}\right)^{-2} = \frac{64}{9}$ 21) _____

A) $\log_{64}(-2) = \frac{3}{8}$ B) $\log_{3/8}(-2) = \frac{64}{9}$
C) $\log_{3/8} \frac{64}{9} = -2$ D) $\log_{64/9} \frac{3}{8} = -2$

Write the logarithmic equation in exponential form.

22) $\log 3 \frac{1}{27} = -3$ 22) _____

A) $3^3 = \frac{1}{27}$ B) $3^{27} = 3$
C) $3^{-3} = \frac{1}{27}$ D) $\left(\frac{1}{27}\right)^3 = 3$

23) $\log 5\ 25 = 2$ 23) _____

A) $252 = 5$ B) $525 = 2$ C) $52 = 25$ D) $25 = 25$

24) $\log 10{,}000{,}000 = 7$ 24) _____

A) $10{,}000{,}0007 = 10$ B) $1010{,}000{,}000 = 7$

C) $107 = 10{,}000{,}000$ D) $710 = 10{,}000{,}000$

25) $\log_2 8 = 3$ 25) _____

A) $2^3 = 3$ B) $2^3 = 8 + 1$ C) $2^3 = 8$ D) $2^3 = \frac{1}{8}$

26) $\log 1{,}000{,}000 = 6$ 26) _____

A) $10^6 = 10{,}000{,}000$ B) $10^6 = 1{,}000{,}000$

C) $10^6 = \frac{1}{1{,}000{,}000}$ D) $10^6 = 6$

Evaluate the logarithm.

27) $\log_2 32$ 27) _____

A) 32 B) 10 C) 5 D) 2

28) $\log_8 \frac{1}{8}$ 28) _____

A) 8 B) 0 C) 1 D) -1

29) $\log_6 \frac{1}{36}$ 29) _____

A) 6 B) -6 C) -2 D) 2

30) $\log_{10} 10$ 30) _____

A) 0 B) 10 C) -1 D) 1

31) $\log_9 \frac{1}{729}$ 31) _____

A) -3 B) -81 C) 81 D) 3

32) $\log_8 32$ 32) _____

A) $\frac{4}{3}$ B) $\frac{3}{2}$ C) $\frac{5}{3}$ D) $\frac{5}{4}$

33) $\ln e$ 33) _____

A) e B) -1 C) 0 D) 1

34) $\ln 1$ 34) _____

A) 1 B) e C) -1 D) 0

35) $\log_7 \sqrt[3]{\frac{1}{49}}$ 35) _____

A) $-\frac{2}{3}$ B) $-\frac{3}{2}$ C) $\frac{3}{2}$ D) $\frac{2}{3}$

36) $\ln e^{\frac{1}{5}}$ 36) _____

A) $\frac{1}{5}$ B) 5 C) 5e D) $\frac{1}{5}e$

Rewrite the expression as a sum, difference, or product of logarithms.

37) log2 10 + log2 11 37) _____

A) log4 21 B) log2 21 C) log4 110 D) log2 110

38) log4 10x 38) _____

A) log2 10 + log2 x B) log4 10 - log4 x

C) log4 10 + log4 x D) log2 10 - log2 x

39) log10 xy 39) _____

A) log5 x - log5 y B) log5 x + log5 y

C) log10 x + log10 y D) log10 x - log10 y

40) $\log 8 \frac{7}{8}$ 40) _____

A) log8 7 + log8 8 B) log8 7 - log8 8

C) log4 7 - log4 8 D) log8 8 - log8 7

41) $\log 6 \frac{\sqrt{13}}{8}$ 41) _____

A) $\log 6\ 8 - \log 6\ \sqrt{13}$ B) $\log 6\ \sqrt{13} + \log 6\ 8$

C) $\log 6\ \sqrt{13} - \log 6\ 8$ D) $\log 3\ \sqrt{13} - \log 3\ 8$

42) $\log_4 \frac{5p}{4k}$ 42) _____

A) $\log_4 5 + \log_4 p - 1 - \log_4 k$ B) $\log_4 5p - \log_4 4k$

C) $\frac{\log_4 5 \log_4 p}{\log_4 k}$ D) $\frac{\log_4 5 + \log_4 p}{1 + \log_4 k}$

43) $\log_4 \frac{9\sqrt[5]{7}}{\sqrt[4]{11}}$ 43) _____

A) $\log_4 9 + \frac{1}{5}\log_4 7 - \frac{1}{4}\log_4 11$ B) $\frac{\log_4 9 + 5\log_4 7}{4\log_4 11}$

C) $\log_4 9 + {}_5\log_4 7 - {}_4\log_4 11$ D) $\frac{\log_4 9 + \frac{1}{5}\log_4 7}{\frac{1}{4}\log_4 11}$

Find the value of the expression.

44) Let $\log_b A = 4$ and $\log_b B = -2$. Find $\log_b AB$. 44) _____

A) 6 B) 8 C) 2 D) -8

45) Let $\log_b A = 4$ and $\log_b B = -8$. Find $\log_b \frac{A}{B}$. 45) _____

A) -4 B) $\frac{1}{2}$ C) $-\frac{1}{2}$ D) 12

46) Let $\log_b A = 5$ and $\log_b B = -2$. Find $\log_b \sqrt[3]{AB}$. 46) _____

A) -2.154 B) 2.154 C) 1.000 D) $\sqrt[3]{-10}$

47) Let $\log_b A = 1.379$ and $\log_b B = 0.342$. Find $\log_b AB$. 47) _____

A) 4.038 B) 1.720 C) 1.038 D) 0.471

48) Let $\log_b A = 2.893$ and $\log_b B = 0.366$. Find $\log_b \frac{A}{B}$. 48) _____

A) 2.527 B) 2.893 C) 1.060 D) 3.259

49) Let $\log_b 2 = a$ and $\log_b 4 = c$. Find $\log_b (4b^4)$. 49) _____

A) 2(a + b) B) 2b + a - 4 C) 2ab D) 2a + 4

Use natural logarithms to evaluate the logarithm to the nearest hundredth.

50) $\log_4 99$ 50) _____

A) 2.00 B) 3.31 C) 0.30 D) 24.75

51) $\log_5 0.079$ 51) _____

A) -1.10 B) -1.58 C) 63.29 D) -0.63

52) $\log_{8.8} 256$ 52) _____

A) 29.09 B) 0.39 C) 2.55 D) 2.41

53) $\log_{8.1} 4.5$ 53) _____

A) 0.65 B) 0.56 C) 0.72 D) 1.39

54) $\log_{\sqrt{3}} 291.2$ 54) _____

A) 10.33 B) 0.24 C) 5.16 D) 0.10

Solve the equation.

55) $\log 2x = \log 4 + \log (x - 1)$ 55) _____

A) $-\frac{2}{3}$ B) 3 C) 2 D) -2

56) $\log (x + 4) = \log (2x + 2)$ 56) _____

A) $-\frac{3}{5}$ B) 6 C) -2 D) 2

57) $\log_2 x = 3$ 57) _____

A) 8 B) 1.58 C) 9 D) 6

58) log

y 14 = 58) ___
2 ___

A) $2^{1/14}$ B) $14^{1/2}$ C) 7 D) 142

59) log (3 + x) - log (x - 5) = log 3 59) _____

A) 9 B) No solution

C) $\frac{5}{2}$ D) -9

60) log4 (2x + 4) = log4 (2x + 3) 60) _____

A) 7 B) $\frac{4}{3}$

C) 0 D) No solution

61) $\log_9 x^2 = \log_9 (4x + 12)$ 61) _____

A) No solution B) 6, -2

C) $\frac{2}{3}$ D) 6

62) $\frac{1}{2} \log_2 x^2 = \log_4 4x$ 62) _____

A) 4 B) 8

C) 4, 0 D) No solution

Solve the problem. Round answers to the nearest hundredth.

63) $e^{y+3} = 2$ 63) _____

A) y = 3.69 B) y = 0.23 C) y = -2.7 D) y =-2.31

64) $3^{0.4x} = 2^{0.51x}$ 64) _____

A) x = 0.26 B) x = -1.13 C) x = 0r D) x = -0.16

Find the domain of the function.

65) f(x) = log (x - 9) 65) _____

A) x > -9 B) x > 9 C) x > 1 D) x > 0

66) f(x) = ln (10 - x) 66) _____

A) x > 10 B) x < 10 C) x < -10 D) x > -10

67) $f(x) = \log_7 (36 - x^2)$ 67) _____

A) -36 < x < 36 B) -6 < x < 6

C) x < -6 and x > 6 D) $-6 \leq x \leq 6$

68) $f(x) = \ln (3x - x^2)$ 68) _____

A) $x \leq 3$ B) -3 < x < 3

C) $-3 \leq x < 0$ D) 0 < x < 3

Solve the problem.

69) An earthquake was recorded which was 39,811 times more powerful eart ake? than a reference level zero earthquake. What is the magnitude of this hqu Use the

formula 69) $M = \log\left(\frac{A}{Ao}\right)$. ___
___

A) 3.6 B) 10.6 C) 0.46 D) 4.6

70) If an earthquake measured 7.9 on the Richter scale, what was the intensity of the earthquake? Use the formula $M = \log\left(\frac{A}{Ao}\right)$. 70) _____

A) 7,943,282 B) 63,095,734
C) 79,432,823 D) 2695

71) An earthquake was recorded as 108.5 times more powerful than a reference level zero earthquake. What was the magnitude of this earthquake on the Richter scale? Use the formula $M = \log\left(\frac{A}{Ao}\right)$. 71) _____

A) 19.6 B) 18.5 C) 8.5 D) 1.5

72) A certain noise measures 52 decibels. If the intensity is multiplied by 100, how many decibels will the new noise measure? Use the formula $D = 10\log\left(\frac{S}{So}\right)$, where $S_o = 10^{-12}$ watt/m^2. 72) _____

A) 72 decibels B) 104 decibels
C) 54 decibels D) 5200 decibels

73) A certain noise produces 7.86 x 10-4 watt/m^2 of power. What is the decibel level of this noise (to nearest decibel)? Use the formula $D = 10\log\left(\frac{S}{So}\right)$, where $S_o = 10^{-12}$ watt/m^2. 73) _____

A) 9 decibels B) 89 decibels
C) 205 decibels D) 79 decibels

74) An RC circuit is a simple electronic circuit consisting of a resistor, a capacitor, and a battery. The current i in the circuit at some time t after the battery is connected is $i = \frac{V}{R}e^{-t/(RC)}$, where V is the battery's voltage, R is the resistance, and C is the capacitance. Solve this equation for C. 74) _____

A) $C = \frac{Ve^{-t}}{R^2C}$ B) $C = \frac{t}{R\ln\left(\frac{V}{iR}\right)}$

C) $C = \frac{V}{R}e^{-t/(iR)}$ D) $C = \frac{-R}{t\ln\left(\frac{iR}{V}\right)}$

75) The pH of a solution is defined as pH = -log[H^+], where [H^+] is the concentration of hydrogen ions in the solution. The pH of pure water is 7, while the pH of milk is about 6. How much greater is the concentration of hydrogen ions in milk than in pure water? 75) _____

A) 2 times greater B) 1000 times greater
C) 100 times greater D) 10 times greater

76) In the formula $N = Ie^{kt}$, N is the number of items in terms of an initial population I at a given time t and k is a growth constant equal to the percent of growth per unit time. How long will it take for the population of a certain country to double if its annual growth rate is 3.6%? Round to the nearest year. 76) _____
A) 19 years B) 56 years C) 1 year D) 8 years

77) In the formula $N = Ie^{kt}$, N is the number of items in terms of an initial population I at a given time t and k is a growth constant equal to the percent of growth per unit time. How long will it take for the population of a certain country to triple if its annual growth rate is 6.9%? Round to the nearest year. 77) _____
A) 43 years B) 1 year C) 16 years D) 7 years

78) In the formula $N = Ie^{kt}$, N is the number of items in terms of an initial population I at a given time t and k is a growth constant equal to the percent of growth per unit time. There are currently 55 million cars in a certain country, increasing by 0.9% annually. How many years will it take for this country to have 80 million cars? Round to the nearest year. 78) _____
A) 42 years B) 358 years C) 5 years D) 28 years

79) The sales of a mature product (one which has passed its peak) will decline by the function $S(t) = S_o e^{-at}$, where t is time in years. Find the sales after 18 years if a = 0.19 and S_o = 30,500. 79) _____
A) 998 B) 825 C) 499 D) 25,222

80) The number of acres in a landfill decreases according to the function B = 7800e-0.03t, where t is measured in years. How many acres will the landfill have after 4 years? 80) _____
A) 16,538 B) 6918 C) 7182 D) 5917

81) A bacteria colony doubles in 4 hr. How long does it take the colony to triple? Use $N = N_0 2^{t/T}$, where N_0 is the initial number of bacteria and T is the time in hours it takes the colony to double. (Round to the nearest hundredth, as necessary.) 81) _____
A) 1.62 hr B) 6.34 hr C) 6 hr D) 12 hr

82) The population of a small country increases according to the function B = 2,100,000e0.02t, where t is measured in years. How many people will the country have after 5 years? 82) _____
A) 4,835,429 B) 2,100,000 C) 2,643,743 D) 2,320,859

83) Use the formula $P = Ie^{kt}$. A bacterial culture has an initial population of 10,000. If its population declines to 4000 in 8 hours, what will it be at the end of 10 hours? 83) _____
A) 1591 B) 1600 C) 3181 D) 3000

84) In the formula $A(t) = A_0 e^{kt}$, A(t) is the amount of radioactive material remaining from an initial amount A_0 at a given time t and k is a negative constant determined by the nature of the material. A certain radioactive isotope has a half-life of approximately 1500 years. How many years would be required for a given amount of this isotope to decay to 55% of that amount? 84) _____

A) 1239 years B) 1728 years
C) 675 years D) 1294 years

85) In the formula $A(t) = A_0 e^{kt}$, A(t) is the amount of radioactive material remaining from an initial amount A_0 at a given time t and k is a negative constant determined by the nature of the material. An artifact is discovered at a certain site. If it has 78% of the carbon-14 it originally contained, what is the approximate age of the artifact, rounded to the nearest year? (carbon-14 decays at the rate of 0.0125% annually.) 85) _____

A) 1760 years B) 1988 years
C) 6240 years D) 863 years

86) In the formula $A(t) = A_0 e^{kt}$, A(t) is the amount of radioactive material remaining from an initial amount A_0 at a given time t and k is a negative constant determined by the nature of the material. A certain radioactive isotope decays at a rate of 0.225% annually. Determine the half-life of this isotope, to the nearest year. 86) _____

A) 3 years B) 222 years C) 134 years D) 308 years

87) The amount of particulate matter left in solution during a filtering process decreases by the equation $P = 700(2)^{-.6n}$, where n is the number of filtering steps. Find the amounts left for n = 0 and n = 5. (Round to the nearest whole number.) 87) _____

A) 700, 88 B) 700, 22 C) 700, 5600 D) 1400, 88

88) In the formula $A(t) = A_0 e^{kt}$, A(t) is the amount of radioactive material remaining from an initial amount A_0 at a given time t and k is a negative constant determined by the nature of the material. An artifact is discovered at a certain site. If it has 57% of the carbon-14 it originally contained, what is the approximate age of the artifact? (carbon-14 decays at the rate of 0.0125% annually.) (Round to the nearest year.) 88) _____

A) 1953 yr B) 3440 yr C) 4560 yr D) 4497 yr

89) In the formula $A(t) = A_0 e^{kt}$, A(t) is the amount of radioactive material remaining from an initial amount A_0 at a given time t and k is a negative constant determined by the nature of the material. A certain radioactive isotope decays at a rate of 0.15% annually. Determine the half-life of this isotope, to the nearest year. 89) _____

A) 5 yr B) 462 yr C) 201 yr D) 333 yr

90) The half-life of an element is 4.9 x 108 yr. How long does it take a sample of the element

to decay 90) ___
$\frac{2}{5}$ ___
to of
its
original
mass?
Use
$A = A_0(\frac{1}{2})^{(t/T)}$

where
A_0 is the
initial
amount,
T is the
half-life,
and t is
the time.
(Express
results in
scientific
notation,
rounded
to the
nearest
hundredt
h.)

A) 5.36 x 108 yr B) 6.48 x 108 yr
C) 1.09 x 108 yr D) 3.11 x 108 yr

91) The decay of 732 mg of an isotope is given by A(t)= 732e-0.015t, where t is time in years. Find the amount left after 36 years. 91) _____

A) 214 B) 420 C) 427 D) 721

Convert the degree measure to radians. Leave the answer as a multiple of π.

92) 30° 92) _____

A) $\frac{\pi}{6}$ B) $\frac{\pi}{8}$ C) $\frac{\pi}{5}$ D) $\frac{\pi}{7}$

93) -45° 93) _____

A) $-\frac{\pi}{3}$ B) $-\frac{\pi}{7}$ C) $-\frac{\pi}{5}$ D) $-\frac{\pi}{4}$

94) 126° 94) _____

A) $\frac{8\pi}{11}$ B) $\frac{6\pi}{9}$ C) $\frac{7\pi}{10}$ D) $\frac{3}{5}\pi$

95) 610° 95) _____

A) $\frac{61}{9}\pi$ B) $\frac{25}{18}\pi$ C) $\frac{61}{36}\pi$ D) $\frac{61}{18}\pi$

Convert the radian measure to degrees.

96) $\frac{\pi}{2}$ 96) _____

A) 45° B) 90° C) 55° D) 180°

97) $\frac{\pi}{4}$ 97) _____

A) -45° B) -32.5° C) -22.5° D) -90°

98) $\frac{5\pi}{6}$ 98) _____

A) 75° B) 300° C) 85° D) 150°

99) $-\frac{7\pi}{10}$ 99) _____

A) -73° B) -252° C) -126° D) -63°

Find the indicated trig function for θ, if θ is an angle in standard position with the terminal side defined by the given point.

100) (18, 24); find sin θ 100) _____

A) $\frac{3}{4}$ B) $\frac{3}{5}$ C) $\frac{4}{5}$ D) $\frac{4}{3}$

101) (3, 4); find cos θ 101) _____

A) $\frac{3}{5}$ B) $\frac{4}{5}$ C) $\frac{4}{3}$ D) $\frac{3}{4}$

102) (-20, 48); find sin θ 102) _____

A) $-\frac{5}{13}$ B) $\frac{5}{13}$ C) $\frac{12}{13}$ D) $-\frac{12}{13}$

103) (3, 4); find csc θ 103) _____

A) $\frac{4}{3}$ B) $\frac{3}{4}$ C) $\frac{5}{4}$ D) $\frac{5}{3}$

104) (4, 7); find tan θ 104) _____

A) $\frac{1}{2}$ B) $\frac{7}{8}$ C) $\frac{4}{7}$ D) $\frac{7}{4}$

105) (9, -5); find cot θ 105) _____

A) $-\frac{9}{5}$ B) $\frac{9}{10}$ C) $-\frac{1}{2}$ D) $-\frac{5}{9}$

Without using a calculator, find the trigonometric function value. Give exact answers with rational denominators.

106) sin 30° 106) _____

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

107) cos 30° 107) _____

A)

$\frac{\sqrt{2}}{2}$ B) $\sqrt{3}$ C) $\frac{1}{2}$ D) $\frac{\sqrt{3}}{2}$

108) cos 60° 108) _____
A) $\frac{\sqrt{2}}{2}$ B) $\frac{1}{2}$ C) $\sqrt{3}$ D) $\frac{\sqrt{3}}{2}$

109) sin 60° 109) _____
A) $\sqrt{3}$ B) $\frac{1}{2}$ C) $\frac{\sqrt{3}}{2}$ D) $\frac{\sqrt{2}}{2}$

110) tan 60° 110) _____
A) $\frac{1}{2}$ B) $\frac{\sqrt{3}}{2}$ C) $\frac{\sqrt{2}}{2}$ D) $\sqrt{3}$

111) tan 45° 111) _____
A) 1 B) $\frac{2\sqrt{3}}{3}$ C) $\frac{1}{2}$ D) $\sqrt{2}$

112) cot 45° 112) _____
A) 1 B) $\sqrt{2}$ C) $\frac{2\sqrt{3}}{3}$ D) $\frac{1}{2}$

113) sec 45° 113) _____
A) 1 B) $\sqrt{2}$ C) $\frac{2\sqrt{3}}{3}$ D) $\frac{1}{2}$

114) csc 45° 114) _____
A) $\sqrt{2}$ B) $\frac{1}{2}$ C) 1 D) $\frac{2\sqrt{3}}{3}$

115) sec 30° 115) _____
A) $\frac{1}{2}$ B) $\frac{2\sqrt{3}}{3}$ C) $\sqrt{2}$ D) 1

If θ is an angle in the indicated quadrant, determine whether the given function is positive or negative.

116) II, sec θ 116) _____
A) Negative B) Positive

117) III, cot θ 117) _____
A) Negative B) Positive

118) IV, cot θ 118) _____
A) Positive B) Negative

119) II, cot θ 119) _____
A) Negative B) Positive

120) III, $\cos \theta$ 120) _____

A) Negative B) Positive

121) IV, $\csc \theta$ 121) _____

A) Negative B) Positive

122) II, $\tan \theta$ 122) _____

A) Positive B) Negative

123) III, $\sec \theta$ 123) _____

A) Positive B) Negative

124) I, $\cot \theta$ 124) _____

A) Negative B) Positive

125) I, $\csc \theta$ 125) _____

A) Negative B) Positive

Find the exact value without using a calculator or table.

126) $\sin \frac{5\pi}{3}$ 126) _____

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

127) $\cos \frac{5\pi}{3}$ 127) _____

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

128) $\sin \frac{5\pi}{6}$ 128) _____

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

129) $\cos\left(-\frac{5\pi}{4}\right)$ 129) _____

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

130) $\tan\left(-\frac{2\pi}{3}\right)$ 130) _____

A) $\frac{\sqrt{3}}{3}$ B) $-\sqrt{3}$ C) $-\frac{\sqrt{3}}{3}$ D) $\sqrt{3}$

131) $\sec \frac{3\pi}{4}$ 131) _____

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

132) $\csc \frac{4\pi}{3}$ 132) _____

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

133) $\cot \frac{3\pi}{4}$ 133) _____

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

134) $\sin \frac{4\pi}{3}$ 134) _____

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

135) $\cos 17\pi$ 135) _____

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

Use a calculator to find the function value to four decimal places.

136) sin 37.5° 136) _____

A) 0.7673 B) 0.6088 C) -0.1978 D) 0.7934

137) cos 76.6° 137) _____

A) 4.1975 B) 0.9728 C) 0.3607 D) 0.2317

138) cot 70.8° 138) _____

A) -8.7211 B) 0.3482 C) 2.8716 D) 0.9444

139) tan 50.3° 139) _____

A) 1.2045 B) 0.7694 C) 0.8302 D) 0.0345

140) csc 53.0° 140) _____

A) 0.6018 B) 0.3959 C) 1.2521 D) 0.7986

Give the amplitude or period as requested.

141) Amplitude of $y = -2 \sin x$ 141) _____

A) 2 B) 2π C) $\frac{\pi}{2}$ D) -2π

142) Amplitude of $y = -2 \sin \frac{1}{3}x$ 142) _____

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

143) Amplitude of $y = -3 \sin 5x$ 143) _____

A) $\frac{3}{5}$ B) 3 C) $\frac{\pi}{5}$ D) $\frac{\pi}{3}$

144) Period of $y = \sin 3x$ 144) _____

A) 2π B) 1 C) $\frac{2\pi}{3}$ D) 3

145) 145) _____

Amplitude of $y = 3\cos \frac{1}{4}x$

A) $\frac{\pi}{3}$ B) 8π C) 3 D) $\frac{3\pi}{4}$

146) Period of $y = \cos 5x$ 146) _____

A) $\frac{2\pi}{5}$ B) 2π C) 5 D) 1

147) 147) _____

Period of $y = 4\cos \frac{1}{4}x$

A) 8π B) $\frac{\pi}{4}$ C) 4 D) $\frac{4\pi}{4}$

148) Period of $y = 2\cos x$ 148) _____

A) 2π B) $\frac{\pi}{2}$ C) π D) 2

149) 149) _____

Find the amplitude of $f(t) = 5\sin\left(\frac{\pi}{11}t - 7\right)$.

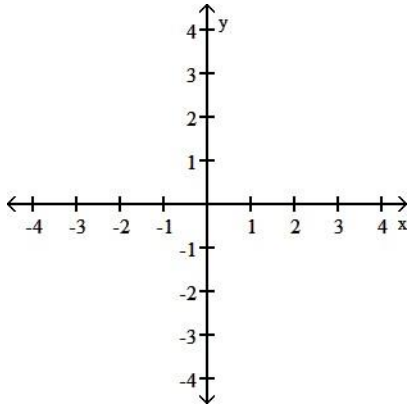
A) -5 B) -7 C) 5 D) 22

150) Find the period of $f(x) = 5\sin(11\pi x + 7)$. 150) _____

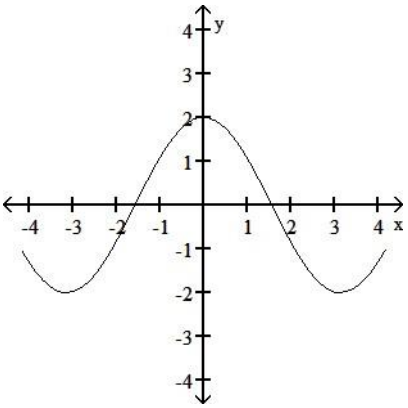
A) $\frac{2\pi}{11}$ B) $\frac{2}{11}$ C) 5 D) 11π

Graph the function.

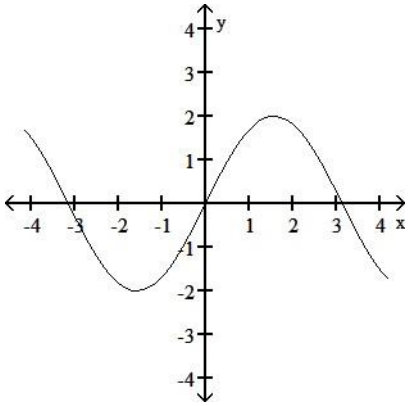
151) $y = 2\sin x$ 151) _____



A)

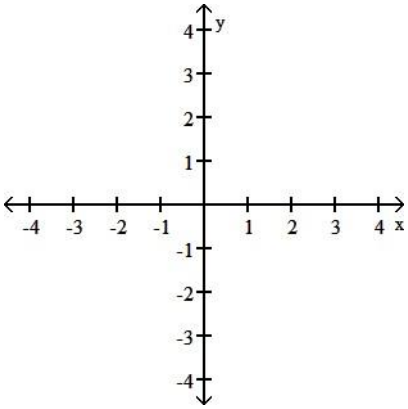


B)

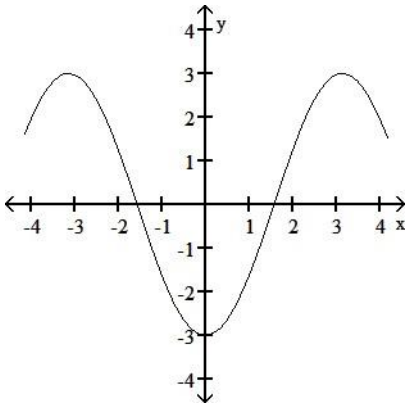


152) y = -3 cos x

152) _____



A)



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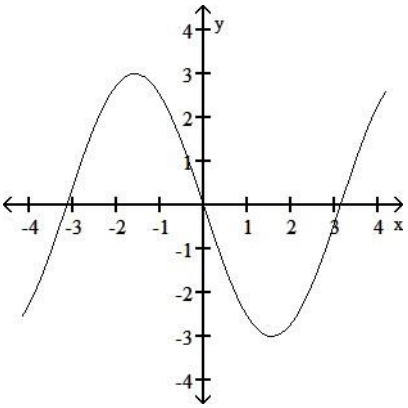
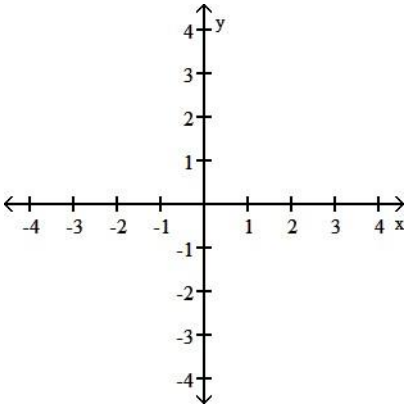
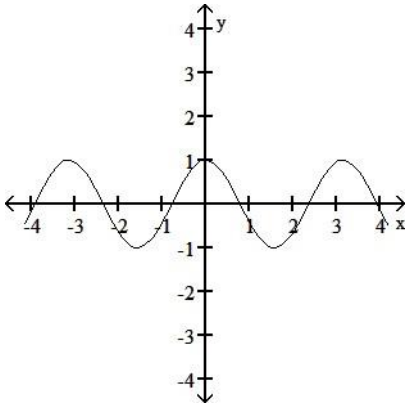


153) y = cos 2x

153) _____



A)



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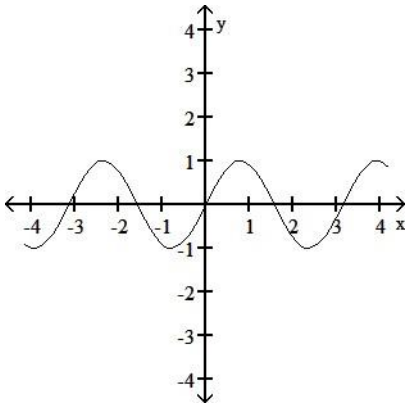
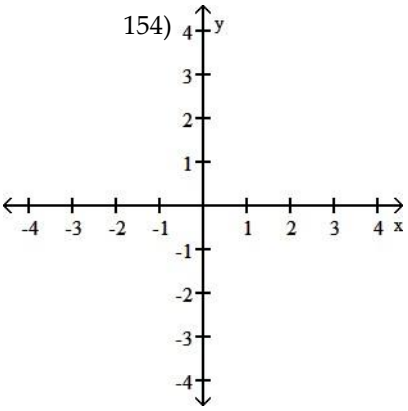


154) $y = \sin \frac{1}{2}x$

154) 

____
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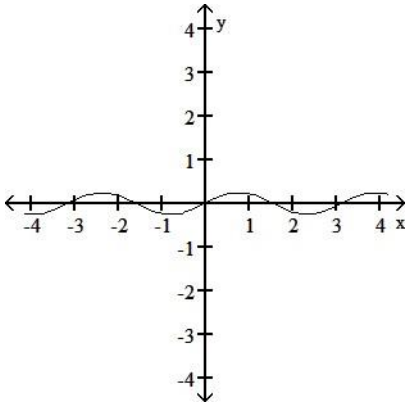
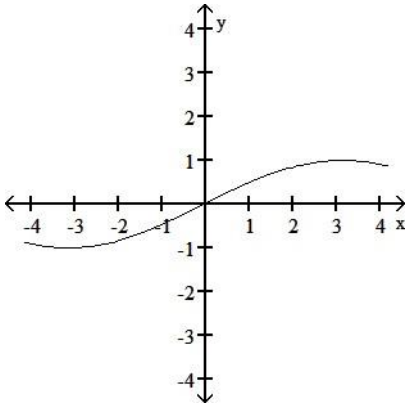
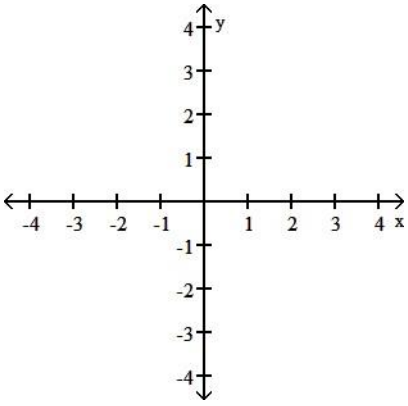
A) 

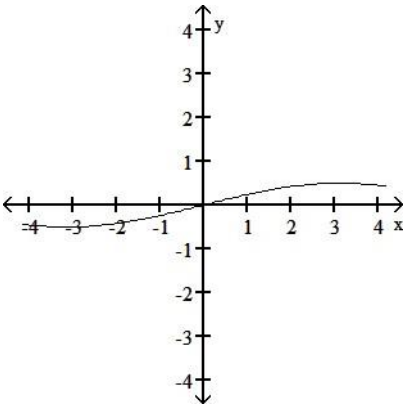
B) 

155) $y = \frac{1}{2} \sin \frac{1}{2} x$

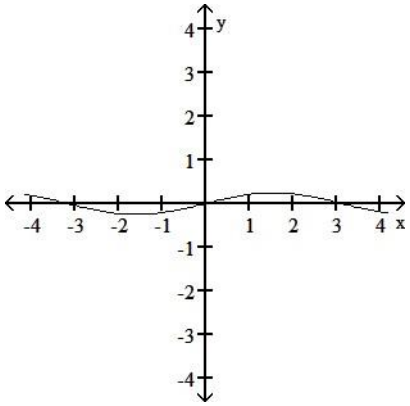
155) _____



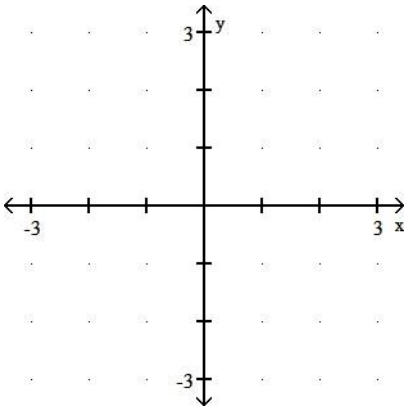
A)



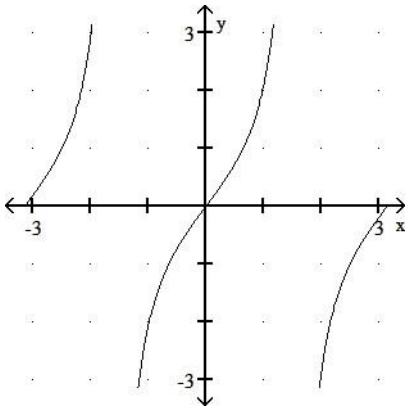
B)



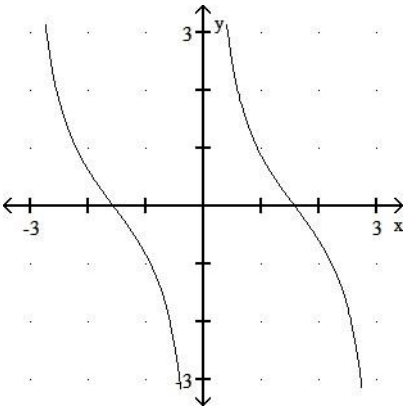
156) $y = \frac{4}{3} \tan x$ 156) _____



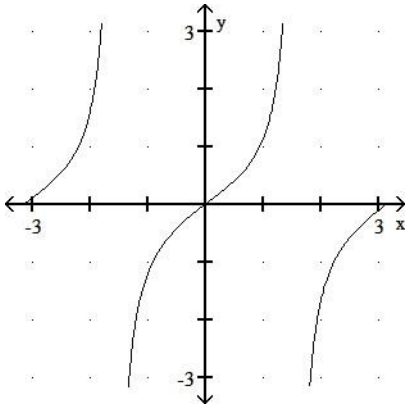
A)



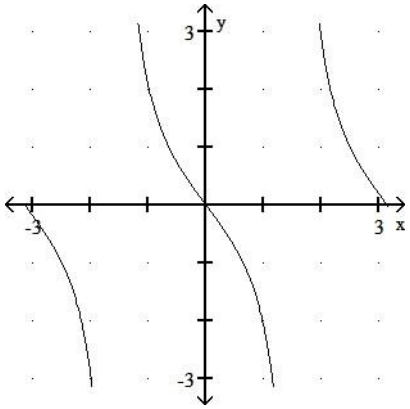
B)



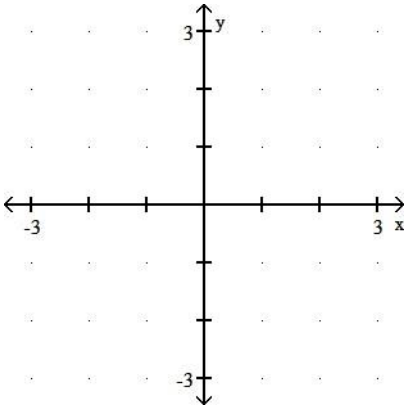
C)



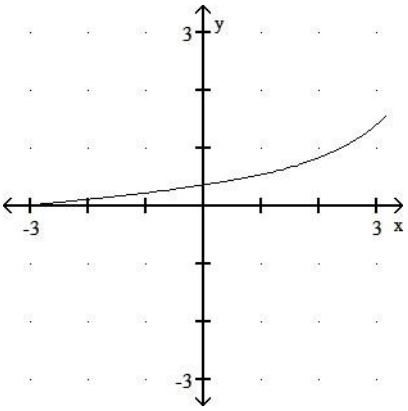
D)



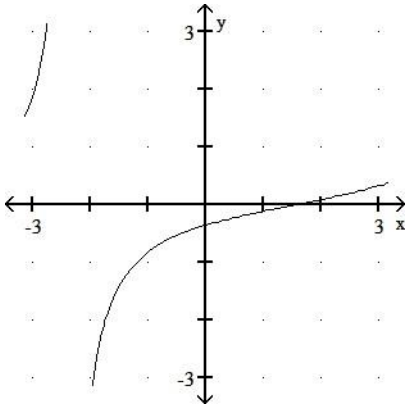
157) $y = \frac{1}{2} \tan\left(\frac{2}{5}x + \frac{\pi}{5}\right)$ 157) _____



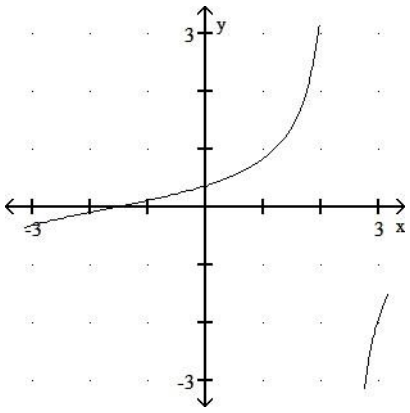
A)



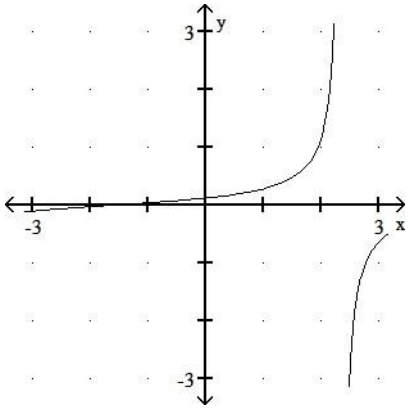
B)



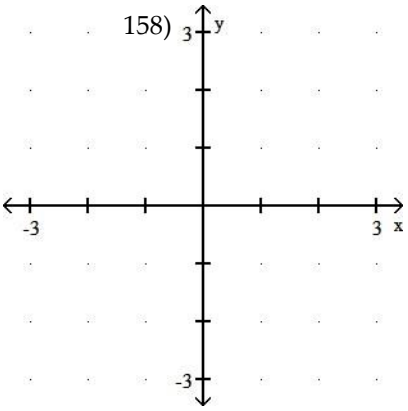
C)

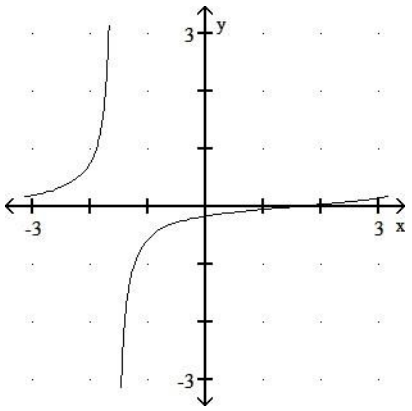


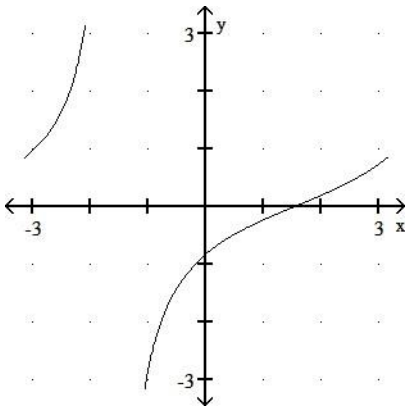
D)

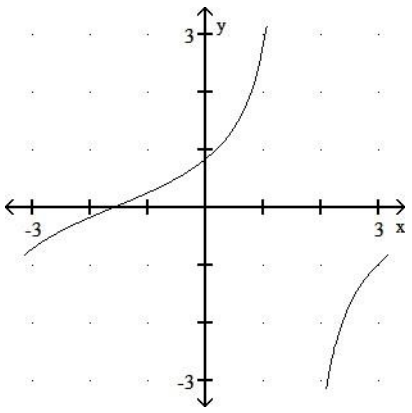


158) $y = \frac{5}{6} \tan\left(\frac{1}{2}x - \frac{\pi}{4}\right)$

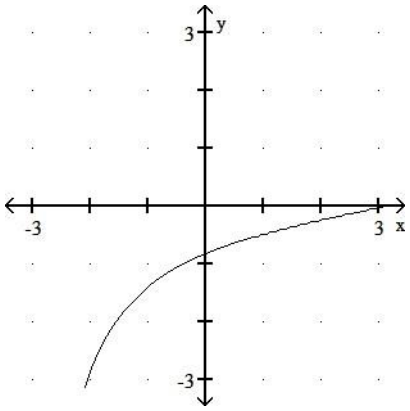
158) 

A) 

B) 

C) 

D)



Solve the problem.

159) The temperature in Fairbanks is approximated by $T(x) = 37 \sin\left[\frac{2\pi}{365}(x - 101)\right] + 25$, where T(x) is the temperature on day x, with x = 1 corresponding to Jan 1 and $x = 365$ corresponding to Dec 31. Estimate the temperature on day 123. 159) _____

A) 14° B) 39° C) 162° D) -25°

160) Use the fact that $\sin x \approx x - \frac{x^3}{6} + \frac{x^5}{120}$ (for values of x near 0) to approximate sin 0.09. 160) _____

A) 0.0899 B) 0.1899 C) 0.9960 D) 0.8960

161) A conservation officer needs to know the width of a river in order to set instruments correctly for a study of pollutants in the river. From point A, the conservation officer walks 105 feet downstream and sights point B on the opposite bank to determine that θ = 35° (see figure). How wide is the river? 161) _____

θ = 35°

105 ft.

A) 150 ft B) 74 ft C) 60 ft D) 128 ft

162) A scientist studying ocean tides places an 8 ft high marker in the water at 6 am on a Monday morning. At that time the water is about 5.5 ft high and receding. The scientist observes that the water reaches its lowest level, 0.1 ft, at 9:18 am and then begins to rise. Assume that the wate r level, in feet, is given by

162) _____

h(t) = $4.9\sin\left(\frac{2\pi}{12.4}t\right)$ + 5, where t represents the number of hours after midnight. (In other words, the marker was placed in the water when t = 6.) Find the first time interval during which the marker is completely underwater.

A) Approximately from 2:06 pm to 4:24 pm Monday
B) Approximately from 11:24 pm Monday to 2:00 am Tuesday
C) Approximately from 1:18 am to 4:54 am Tuesday
D) Approximately from 1:42 pm to 5:18 pm Monday

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

52) C
53) C
54) A
55) C
56) D
57) A
58) B
59) A
60) D
61) B
62) A
63) D
64) C
65) B
66) B
67) B
68) D
69) D
70) C
71) C
72) A
73) B
74) B
75) D
76) A
77) C
78) A
79) A
80) B
81) B
82) D
83) C
84) D
85) B
86) D
87) A
88) D
89) B
90) B
91) C
92) A
93) D
94) C
95) D
96) B
97) A
98) D
99) C
100) C
101) A
102) C
103) C

104) D
105) A
106) B
107) D
108) B
109) C
110) D
111) A
112) A
113) B
114) A
115) B
116) A
117) B
118) B
119) A
120) A
121) A
122) B
123) B
124) B
125) B
126) A
127) A
128) D
129) C
130) D
131) D
132) A
133) C
134) B
135) B
136) B
137) D
138) B
139) A
140) C
141) A
142) D
143) B
144) C
145) C
146) A
147) A
148) A
149) C
150) B
151) B
152) A
153) A
154) B
155) A

156) A
157) C
158) B
159) B
160) A
161) B
162) D