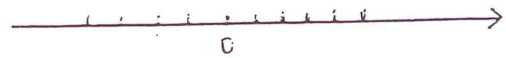
PreCalculus Review

1. Find the distance between –5 and –4 on a number line.



[A] 9 [B] –9 [C] 1 [D] –1

2. Evaluate the expression for the given value of x.

$$-\frac{12}{5}-x \text{ for } x=-\frac{11}{12}$$

[A] $\frac{1}{7}$ [B] $-\frac{23}{17}$ [C] $-\frac{89}{60}$ [D] $-\frac{199}{60}$

3. Perform the operation. (Write the fractional answer in simplest form.)

$$\frac{1}{6}+\frac{1}{4}$$

[A] $\frac{5}{12}$ [B] $\frac{12}{5}$ [C] $\frac{1}{5}$ [D] $\frac{15}{2}$

4. Simplify the expression.

$$\frac{-18x^4y^5}{6x^2y}$$

[A] $-3x^2y^4$ [B] $-3x^6y^6$ [C] $-18xy$ [D] $\frac{1}{-3x^2y^4}$

5. Find the number written in scientific notation.
The diameter of a water molecule is 0.0000000276 cm.

[A] 2.76×10^{-7} cm [B] 27.6×10^{-8} cm [C] 27.6×10^{-9} cm [D] 2.76×10^{-8} cm

6. Simplify by removing all possible factors from the radical.

$$\sqrt{(-12t)^2}$$

[A] $12|t|$ [B] $|12|t$ [C] $12t$ [D] Does not exist as real

7. Simplify by removing all possible factors from each radical.
$\sqrt[5]{729a^6b^5}$

[A] $3ab\sqrt[5]{3a}$ [B] $3a^5b^5\sqrt[5]{3a}$ [C] $3ab\sqrt[4]{3a}$ [D] $3ab\sqrt[5]{3ab}$

8. Rationalize the denominator of the expression. Then simplify the answer.
$\frac{11}{\sqrt{2}}$

[A] $\frac{11\sqrt{2}}{4}$ [B] $11\sqrt{2}$ [C] $\frac{11\sqrt{2}}{2}$ [D] $\frac{\sqrt{11}}{2}$

9. Evaluate the expression without using a calculator.
$243^{4/5}$

[A] $\frac{972}{5}$ [B] 243 [C] 81 [D] $\frac{1}{3}$

10. Express the polynomial in standard form.
$5x^4+5x+2x^5+4$

[A] $-4-5x-5x^4-2x^5$ [B] $2x^5+5x^4+5x+4$

[C] $4+5x+5x^4+2x^5$ [D] $-2x^5-5x^4-5x-4$

11. Perform the indicated operations.
$(-x^2-7x-5)+(4x^2+x-4)$

[A] $-5x^2-8x-1$ [B] $3x^2-6x-9$

[C] $-5x^2-6x-9$ [D] $3x^2-8x-1$

12. Multiply or find the special product.
$(5f^2+4g)(5f^2-4g)$

[A] $25f^4+20f^2g-16g^2$ [B] $25f^4-40g^2-16$
[C] $25f^4-16g^2$ [D] $25f^4+40f^2g-16g^2$

13. Completely factor the expression.
$g^2 - 10g + 25 - h^2$

[A] $(g-5+h)(g+5-h)$

[B] $g(g-10)-(-5+h)(-5-h)$

[C] $(g-5+h)(g-5-h)$

[D] $g(g-10)+(-5+h)(-5-h)$

14. Factor the trinomial.
$5x^2 - 22x + 8$

[A] $(x+4)(5x+2)$ [B] $(x-4)(5x-2)$ [C] $(5x+4)(x+2)$ D] $(5x-4)(x-2)$

15. Find the domain of the expression.
$-\sqrt{7-x}$

[A] All real numbers x such that $x \geq -7$

[B] All real numbers x such that $x \geq 7$

[C] All real numbers x such that $x \leq -7$

[D] All real numbers x such that $x \leq 7$

16. Write the rational expression in simplest form.
$$\frac{x^2+5x+4}{x^2-3x-28}$$

[A] $\frac{x-1}{x-7}$, $x \neq 7$, $x \neq 4$

[B] $\frac{x+1}{x+7}$, $x \neq -7$, $x \neq -4$

[C] $\frac{x+1}{x-7}$, $x \neq 7$, $x \neq -4$

[D] $\frac{x-1}{x+7}$, $x \neq -7$, $x \neq 4$

17. Perform the operation(s) and simplify.
$$\frac{5}{x^2-9}+\frac{6}{x-4}-\frac{5}{x+3}$$

[A] $\frac{x^2-30x-14}{(x^2-9)(x-4)}$ [B] $\frac{11x-4}{x^2+2x-8}$ [C] $\frac{x^2+40x-134}{(x^2-9)(x-4)}$ [D] $\frac{x^2+10x-14}{(x^2-9)(x-4)}$

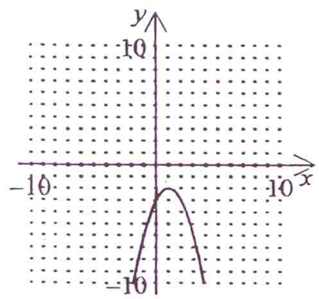
18. Simplify the complex fraction.

$$\frac{x-\frac{1}{x^2}}{x-\frac{1}{x^3}}$$

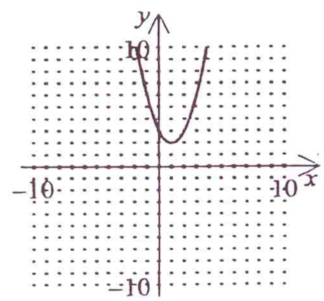
[A] $\frac{x}{x^2-1}$ [B] $\frac{x(x^2+x+1)}{(x+1)(x^2+1)}$ [C] $\frac{1}{x+1}$ [D] $\frac{x(x^2-x+1)}{(x+1)(x^2+1)}$

19. Use point plotting to sketch the graph.
$y=-x^2-2x-3$

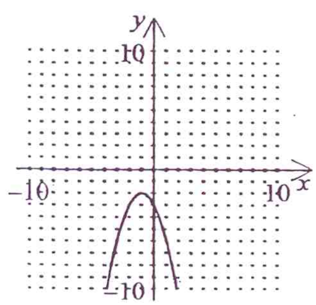
[A]



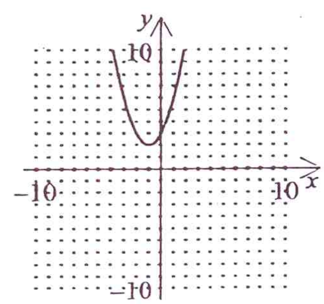
[B]



[C]



[D]



20. Find the slope of the line passing through the pair of points.
$(-1,\ -6),\ (3,\ 2)$

[A] 2 [B] −2 [C] $\frac{1}{2}$ [D] 0

21. Express the equation in slope-intercept form and find the slope and the y-intercept.
$-9x+3y=5$

[A] $y=3x-\frac{9}{5}$; $m=\frac{1}{3}$; intercept: $\left(0,\ -\frac{5}{9}\right)$

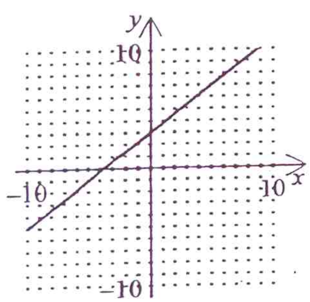
[B] $y=-9x+\frac{5}{9}$; $m=-9$; intercept: $\left(0,\ -\frac{5}{9}\right)$

[C] $y=3x+\frac{5}{3}$; $m=3$; intercept: $\left(0,\ \frac{5}{3}\right)$

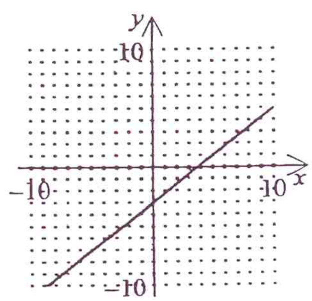
[D] Given in slope-intercept form; $m=3$; intercept: $(0,\ -5)$

22. Find the slope-intercept form of the equation and its graph.
$-8x+10y=-30$

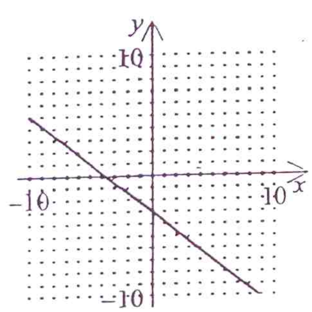
[A] $y=\frac{4}{5}x+3$



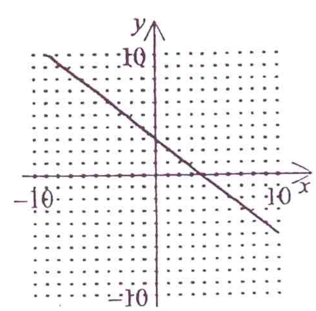
[B] $y=\frac{4}{5}x-3$



[C] $y=-\frac{4}{5}x-3$



[D] $y=-\frac{4}{5}x+3$



23. Find the domain and range of the function.

$f(x) = 4|x+8|$

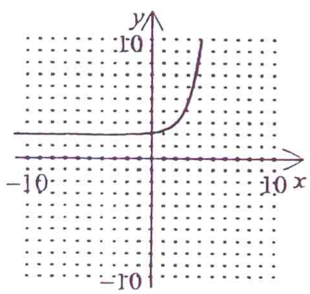
[A] Domain: $[0,\infty)$; Range: $(-\infty,\infty)$

[B] Domain: $(-\infty,\infty)$; Range: $[4,\infty)$

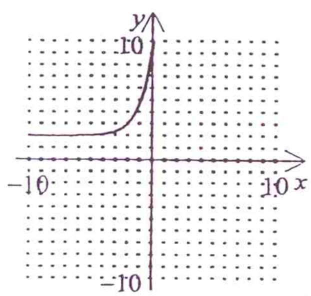
[C] Domain: $(-\infty,\infty)$; Range: $[0,\infty)$

[D] Domain: $[-8,\infty)$; Range: $[0,\infty)$

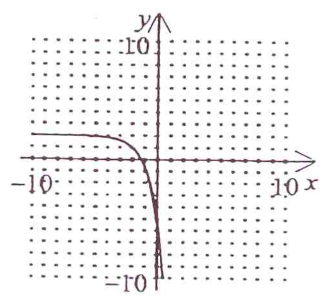
24. Given the graph of a function $f(x)$, find the graph of $-f(x)$.



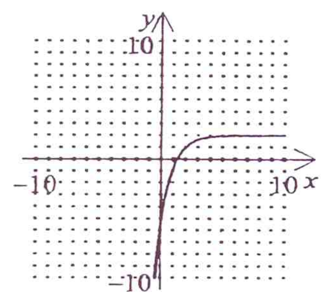
[A]



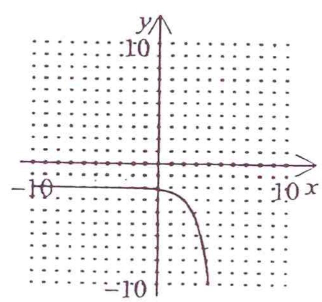
[B]



[C]



[D]



25. Find the solution to the equation.

$$\frac{x}{6}+\frac{2x}{7}=19$$

[A] 42 [B] 266 [C] 37 [D] $6\frac{1}{3}$

26. Use the Quadratic Formula to solve.

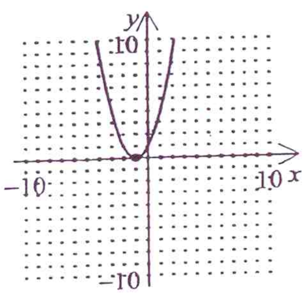
$$x^2+6x+2=0$$

[A] $-3\pm 2\sqrt{7}$ [B] $-3\pm\sqrt{7}$ [C] $3\pm\sqrt{7}$ [D] $3\pm 2\sqrt{7}$

27. Find the graph of the quadratic function and list any x-intercepts.

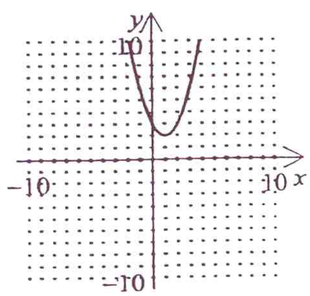
$$f(x)=x^2-x-2$$

[A]



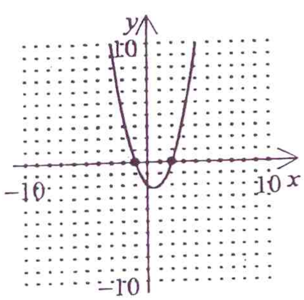
$(-1,\ 0)$

[B]



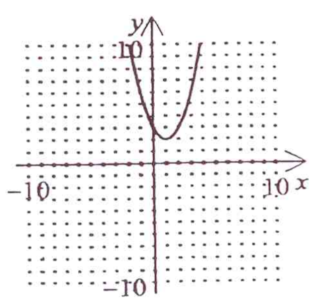
No x-intercepts

[C]



$(-1,\ 0),\ (2,\ 0)$

[D]



$(-1,\ 0),\ (2,\ 0)$

28. The demand for motors depends on the price per motor. A manufacturer determines that the number of motors he can sell is

$$d=-2p^2+140p-240$$

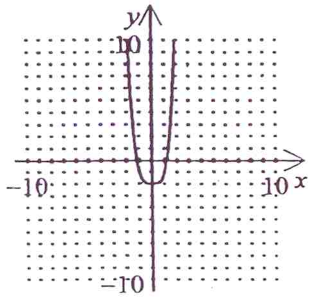
where p is the price per motor in dollars. At what price will the demand for motors be at a maximum?

[A] \$30 [B] \$70 [C] \$60 [D] \$35

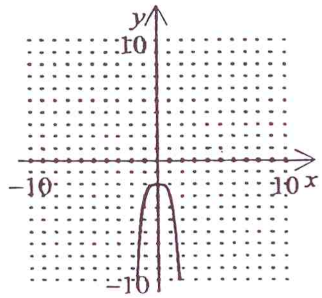
29. Sketch the graph of the function.

$f(x) = x^4 - 2$

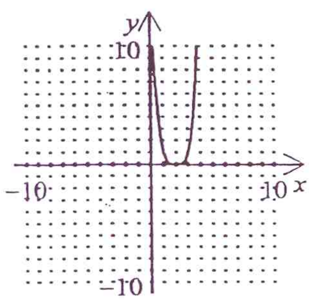
[A]



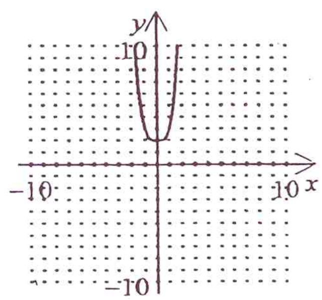
[B]



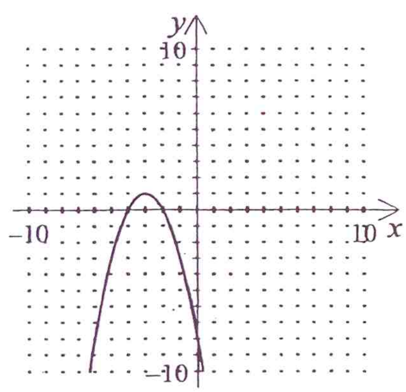
[C]



[D]



30. Find the equation of the function graphed below.



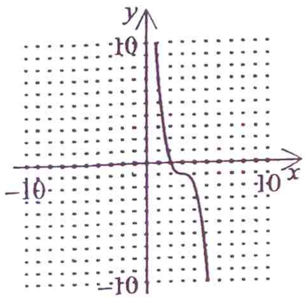
[A] $f(x) = x^3 - 6x^2 - 8x$ [B] $f(x) = x^2 - 6x - 8$

[C] $f(x) = -x^2 - 6x - 8$ [D] $f(x) = -x^3 - 6x^2 - 8x$

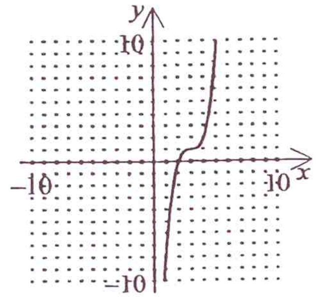
31. Sketch the graph of the function.

$f(x) = (x-3)^4 + 1$

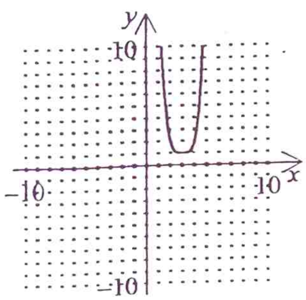
[A]



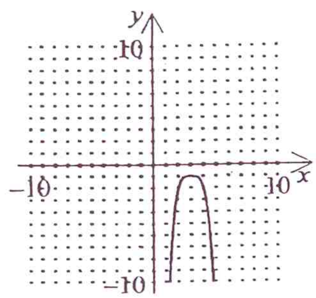
[B]



[C]



[D]



32. Find the right-hand and left-hand behavior of the graph of the polynomial function.

$f(x) = -5x^4 - 2x^2 - 4$

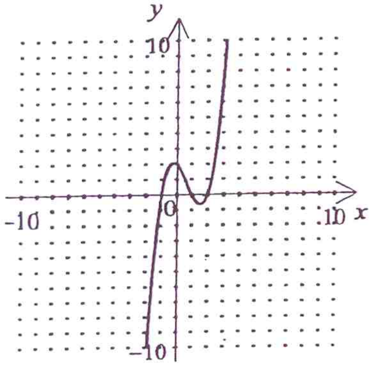
[A] Rises to the left.
Rises to the right.

[B] Falls to the left.
Rises to the right.

[C] Rises to the left.
Falls to the right.

[D] Falls to the left.
Falls to the right.

33. Find a polynomial function that has zeros at –1, 2, and 1 and matches the graph below.



[A] $f(x) = -x^3 + 2x^2 + x + 2$ [B] $f(x) = x^2 - 2x - 1$

[C] $f(x) = x^3 - 2x^2 - x + 2$ [D] $f(x) = x^2 - x - 2$

34. Use the Intermediate Value Theorem to determine an interval in which the function is guaranteed to have a zero.
$f(x) = 3x^5 + 5x^4 + 9x^3 - 2x^2 - 2x + 5$

[A] $[-1, 0]$ [B] $[-6, -5]$ [C] $[-2, -1]$ [D] $[-3, -2]$

35. Use long division to divide.
$$\frac{c^3 - 343}{c - 7}$$

[A] $c^2 + 49$ [B] $c^2 - 49$ [C] $c^2 + 7c + 49$ [D] $c^2 - 7c + 49$

36. Use synthetic division to divide.
$(2z^5 + 2z^3 + 4z - 4) \div (z + 2)$

[A] $-2z^4 + 4z^3 - 10z^2 + 20z - 44 - \dfrac{92}{z+2}$

[B] $2z^5 - 4z^4 + 10z^3 - 20z^2 + 44z - 92$

[C] $2z^4 - 4z^3 + 10z^2 - 20z + 44 - \dfrac{92}{z+2}$

[D] $-4z^4 + 10z^3 - 20z^2 + 44z - 92$

37. Factor $4x^3+29x^2+55x+12$ given that $x+3$ is one of its factors.

[A] $(x+3)(x-4)(4x-1)$ [B] $(x+3)(x+4)(4x-1)$

[C] $(x+3)(x+4)(4x+1)$ [D] $(x+3)(x-4)(4x+1)$

38. Use the Rational Zero Test to determine all possible rational zeros of *f*. Do not find the actual zeros.
$f(x)=5x^3+x^2+4x-10$

[A] $\pm 2,\ \pm 5,\ \pm 10,\ \pm\frac{1}{5},\ \pm\frac{2}{5},\ \pm\frac{7}{5}$

[B] $0,\ \pm 1,\ \pm 2,\ \pm 5,\ \pm\frac{1}{5},\ \pm\frac{2}{5}$

[C] $\pm 2,\ \pm 5,\ \pm 10,\ \pm 50,\ \pm\frac{1}{5},\ \pm\frac{2}{5}$

[D] $\pm 1,\ \pm 2,\ \pm 5,\ \pm 10,\ \pm\frac{1}{5},\ \pm\frac{2}{5}$

39. Find the real zeros of the function.
$f(x)=x^3-3x^2+6x-8$

[A] 3, 4 [B] 2, 5 [C] 3 [D] 2

40. Find a third-degree polynomial function with real coefficients and with zeros at 2 and $4+i$.

[A] $P(x)=x^3-6x^2+x+34$ B] $P(x)=x^3+10x^2+33x+34$

[C] $P(x)=x^3-10x^2+x-34$ [D] $P(x)=x^3-10x^2+33x-34$

41. Find all the zeros of the function.
$f(x)=x^4+8x^3+13x^2-32x-68$

[A] $\pm 4,\ 2\pm 2i$ [B] $\pm 2,\ -4\pm 2i$ [C] $\pm 4,\ 2\pm i$ [D] None of these

42. Determine the domain of the function.

$f(x)=\dfrac{(x-1)}{(x-6)(x+4)}$

[A] All real numbers $x \neq -6$, $x \neq 4$

[B] All real numbers $x \neq -4$, $x \neq 6$

[C] All real numbers $x \neq -4$, $x \neq 1$, $x \neq 6$

[D] All real numbers

43. Find the horizontal asymptotes, if any, of the graph of $f(x)=\dfrac{2x^2+8}{3x^2+4x-1}$.

[A] $y=\dfrac{2}{3}$

[B] $y=-8$

[C] $y=0$

[D] No horizontal asymptotes

44. Evaluate the expression.

$9^{\sqrt{3}}$

[A] 44.957

[B] 140.296

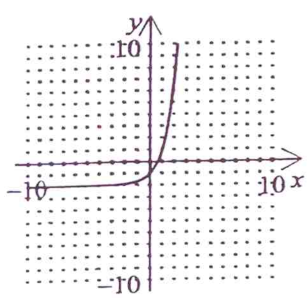
[C] 0.022

[D] 15.588

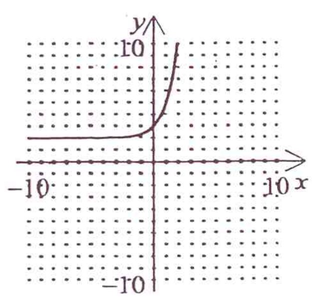
45. Find the graph of the function.

$f(x)=3^x+2$

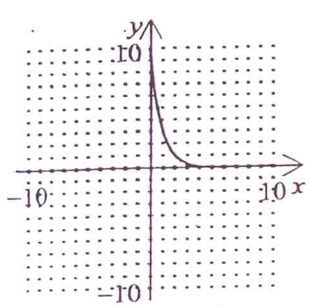
[A]



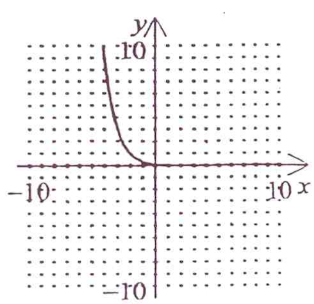
[B]



[C]



[D]



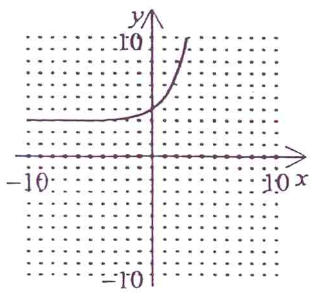
46. Evaluate the expression.
$1+e^{-1.4}$

[A] 1.247 [B] 6.288 [C] 0.159 [D] 5.055

47. Use a calculator to evaluate the logarithm.
$\log_{10}67$

[A] 4.205 [B] 1.826 [C] 0.238 [D] 0.548

48. Find the graph of the logarithmic function.
$f(x)=\log_2 x-3$

[A]


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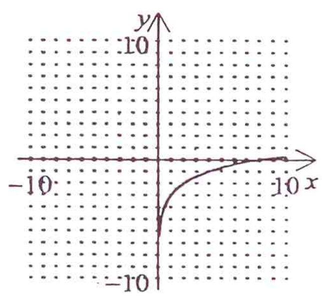
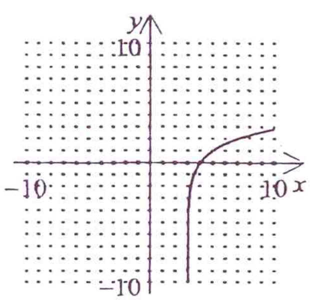
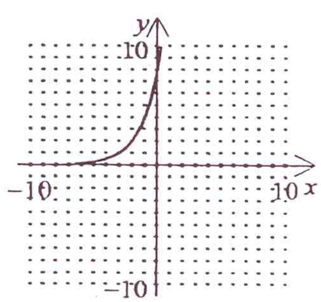


[C]


[D]


49. Evaluate the expression without using a calculator.
$\ln e^{-6}$

[A] $-\frac{1}{6}$ [B] -6 [C] $\frac{1}{-6e}$ [D] $-6e$

50. Evaluate the logarithm using the change-of-base formula.

$\log_7 \frac{2}{3}$

[A] –2.838 [B] –0.208 [C] –0.789 [D] –0.058

51. Find the expression that is equivalent to the given logarithmic expression.

$\log_b \sqrt{\frac{15}{67}}$

[A] $\log_b \frac{1}{2}(15 - 67)$

[B] $\frac{1}{2}(\log_b 15 + \log_b 67)$

[C] $\frac{1}{2}(\log_b 15 - \log_b 67)$

[D] $\sqrt{\log_b 15 - \log_b 67}$

52. Use the properties of logarithms to expand the expression. (Assume all variables are positive.)

$\log_b \sqrt[3]{\frac{x^9 y^5}{z^4}}$

[A] $\frac{10}{3} \log_b (x + y - z)$

[B] $3 \log_b x + \frac{5}{3} \log_b y - \frac{4}{3} \log_b z$

[C] $27 \log_b x + 15 \log_b y - 12 \log_b z$

[D] $\sqrt[3]{\frac{45(\log_b x)(\log_b y)}{4 \log_b z}}$

53. Solve for x.

$\ln x - \ln 1 = 0$

[A] $1e$ [B] e^1 [C] $\ln 1$ [D] 1

54. Solve the exponential equation algebraically.

$7^x = 5^{x-4}$

[A] -10 [B] -9.567 [C] -1.811 [D] -19.133

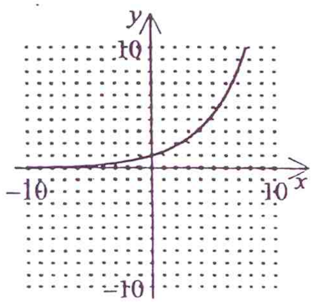
55. Find the value of x.

$\log_3(x+6)-\log_3 x=5$

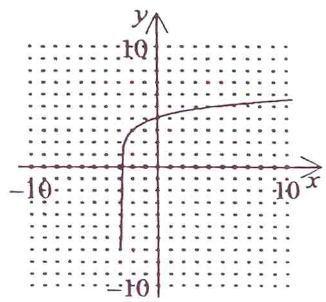
[A] 0.025 [B] 40.333 [C] 2.333 [D] 0.429

56. Find a graph that models an exponential decay function.

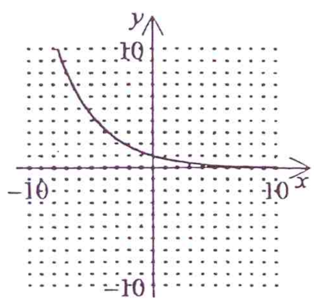
[A]



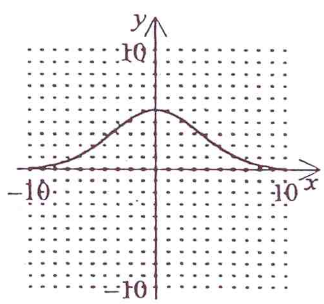
[B]



[C]

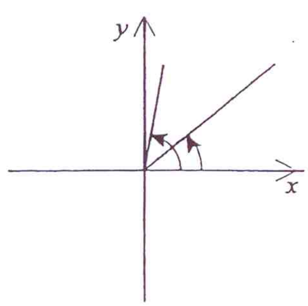


[D]

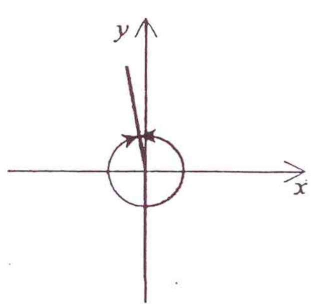


57. Sketch a pair of coterminal angles.

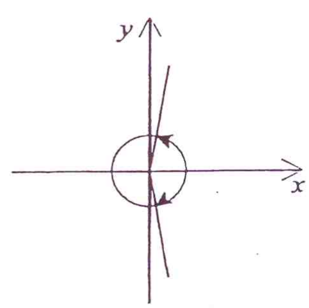
[A]



[B]



[C]



58. In which quadrant is the terminal side of the angle θ?
$\theta = 315°$

[A] Quadrant I   [B] Quadrant II   [C] Quadrant III   [D] Quadrant IV

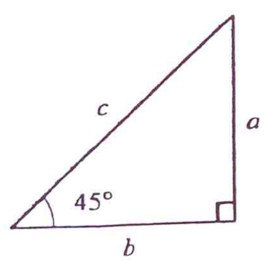
59. If possible, find the complement of the angle $\theta = \frac{\pi}{10}$.

[A] $\frac{3\pi}{5}$ [B] $\frac{2\pi}{5}$ [C] $\frac{9\pi}{10}$ [D] not possible

60. Convert the measure from degrees to radians. Round to three decimal places.
283°

[A] 4.439   [B] 5.939   [C] 5.439   [D] 4.939

61. Find the ratio $\frac{a}{b}$ for the indicated angle and give its value.



[A] $\cot 45° = \frac{\sqrt{2}}{2}$ [B] $\tan 45° = 1$ [C] $\cos 45° = \frac{\sqrt{2}}{2}$ [D] $\sin 45° = \frac{\sqrt{2}}{2}$

62. Use the fundamental trigonometric identities to determine the simplified form of the expression.
$\cot \beta \sin \beta$

[A] $\cos \beta$ [B] $\csc \beta$ [C] $\sec \beta$ [D] $\tan \beta$

63. Use a calculator to evaluate the function. (Be sure the calculator is in the correct angle mode.)
$\tan 34.37°$

[A] -0.6150 [B] -0.1897

[C] 0.6839 [D] 1.4621

64. Find the quadrant in which θ lies.
$\sin\theta > 0$ and $\tan\theta < 0$

[A] Quadrant I [B] Quadrant II [C] Quadrant III [D] Quadrant IV

65. Find the reference angle θ'. $\theta = -3.4$

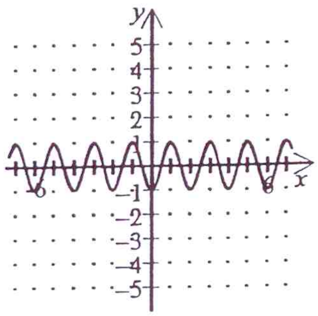
[A] 0.2584 [B] 2.8832 [C] 1.8292 [D] -3.4

66. Use a calculator to approximate two values of $\theta\,(0 \le \theta < 2\pi)$ that satisfy the equation.
$\cot\theta = 0.3888$

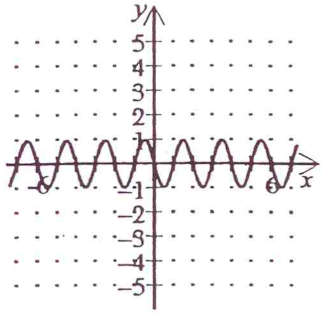
[A] 1.985, 4.342 [B] 1.200, 5.127 [C] 1.200, 4.342 [D] 1.985, 5.127

67. Find the graph of the function.
$y = -\cos \pi x$

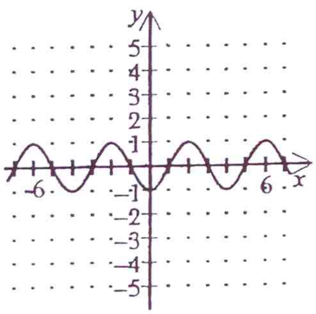
[A]



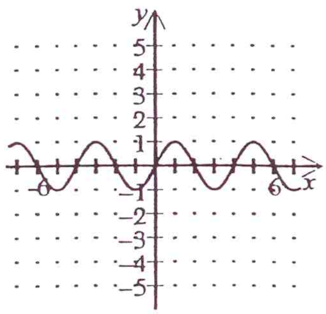
[B]



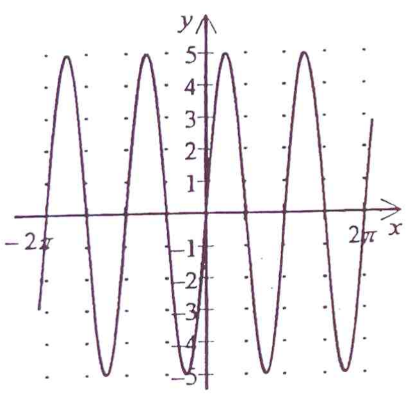
[C]



[D]



68. Find the amplitude and the period of the graphed function.



[A] amplitude = –5; period = $\frac{\pi}{2}$

[B] amplitude = –5; period = π

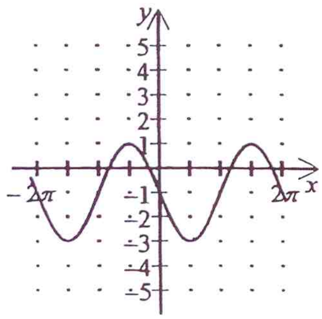
[C] amplitude = 5; period = $\frac{\pi}{2}$

[D] amplitude = 5; period = π

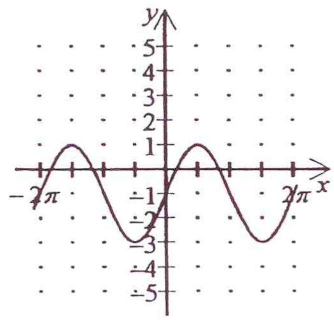
69. Graph the cosine function that has the given phase shift and vertical translation.

phase shift $= \frac{\pi}{2}$; vertical shift $= -1$

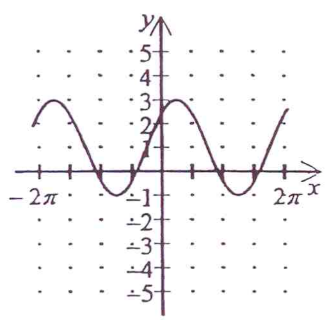
[A]



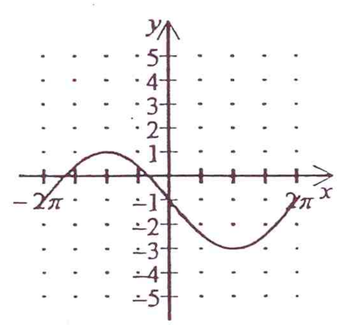
[B]



[C]

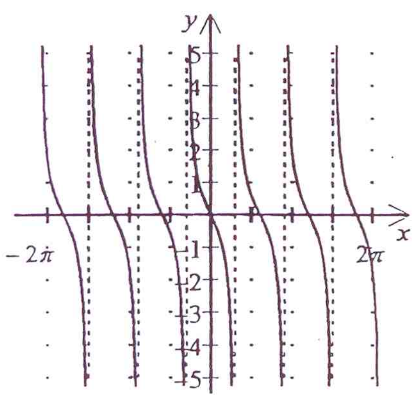


[D]



Find the function that is represented by the graph below.

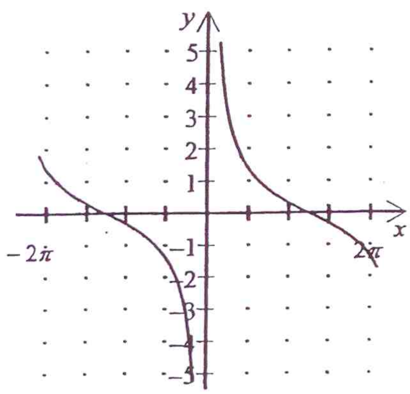
70.



[A] $y = -\cot\frac{3x}{5}$ [B] $y = \cot\frac{5x}{3}$ [C] $y = -\tan\frac{5x}{3}$ [D] $y = -\tan\frac{3x}{5}$

Find the function that is represented by the graph below.

71.

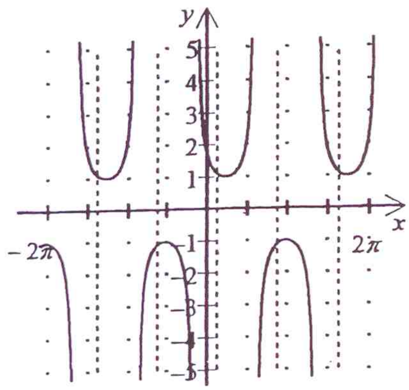


[A] $y = \tan \frac{5x}{2}$ [B] $y = -\tan \frac{2x}{5}$ [C] $y = -\cot \frac{5x}{2}$ [D] $y = \cot \frac{2x}{5}$

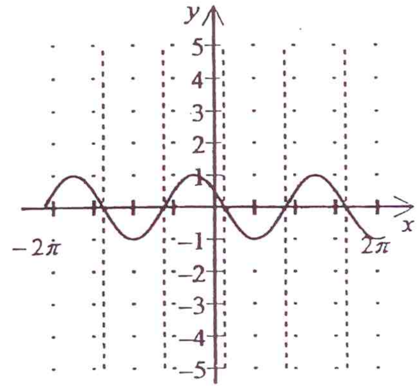
72. Sketch the graph of the function.

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

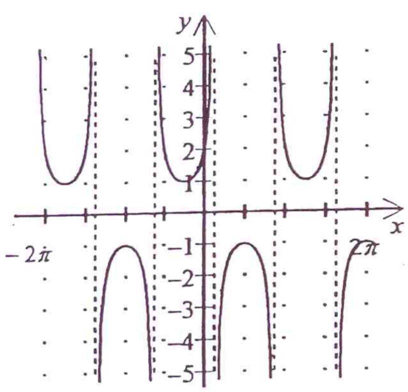
[A]



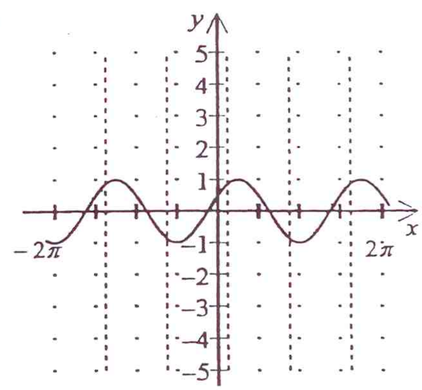
[B]



[C]



[D]



73. Use a calculator to approximate the expression.

$\arcsin(-0.64)$

[A] -89.53 [B] -0.69 [C] -0.11 [D] -1.67

Evaluate the expression without the aid of a calculator.

74. arcsin 0

[A] $\frac{\pi}{2}$ [B] $\frac{\pi}{4}$ [C] 0 [D] π

Evaluate the expression without the aid of a calculator.

75. $\arctan \frac{\sqrt{3}}{3}$

[A] $-\frac{\pi}{6}$ [B] $-\frac{\pi}{3}$ [C] $\frac{\pi}{6}$ [D] $\frac{\pi}{3}$

Use the properties of inverse functions to evaluate the expression.

76. $\cos\left(\arcsin \frac{2\sqrt{x}}{1+x}\right)$

[A] $\frac{2\sqrt{x}}{1-x}$ [B] $\frac{1-x}{1+x}$ [C] $\frac{2\sqrt{x}}{1+x}$ [D] $\frac{1+x}{1-x}$

Use the properties of inverse functions to evaluate the expression.

77. $\tan\left(\arcsin \frac{1}{2}\right)$

[A] 2 [B] $\sqrt{3}$ [C] $\frac{\sqrt{3}}{2}$ [D] $\frac{\sqrt{3}}{3}$

Use the properties of inverse functions to evaluate the expression.

78. $\arcsin(\sin 8.7)$

[A] –0.7248 [B] 1.3797 [C] 0.7248 [D] 8.7

79. Is the equation $1-\sin^2 A = \cos^2 A$ a valid form of the Pythagorean trigonometric identities?

[A] Yes [B] No

80. Use trigonometric substitution to write the algebraic expression as a trigonometric function of θ, where $0 < \theta < \frac{\pi}{2}$.

$\sqrt{100-4x^2}$, $x = 5\cos\theta$

[A] $100\sin^2\theta$ [B] $10\sin\theta$ [C] $20\sin\theta$ [D] $10+5\cos\theta$

81. Find a fundamental identity that could be used to verify the identity given below.

$$\frac{\sin^2 x}{1-\cos^2 x} = 1$$

[A] quotient identity [B] Pythagorean identity

[C] cofunction identity [D] even/odd identity

82. Find an expression that completes the identity.

$$\frac{2\sin^2 x + \cos 2x}{\sec x} =$$

[A] $\frac{1+\csc x}{\csc x}$ [B] $\sin x$ [C] $\cos x$ [D] $\frac{1-\sin x}{\cos x}$

83. Find the x-values that are solutions of the equation.

$$5\cot^2 x - 15 = 0$$

[A] $\frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$ [B] $\frac{\pi}{4}, \frac{\pi}{2}, \frac{2\pi}{3}, \frac{5\pi}{6}$

[C] $\frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$ [D] $\frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$

Find all solutions of the equation in the interval $[0, 2\pi)$.

84. $2\cot^2 x - 3\csc x = 0$

[A] 0 [B] $\frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$ [C] $\frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$ [D] $\frac{\pi}{6}, \frac{5\pi}{6}$

Find all solutions of the equation in the interval $[0, 2\pi)$.

85. $2\csc^2 \frac{x}{2} - 3\csc\frac{x}{2} - 2 = 0$

[A] $\frac{4\pi}{3}$ [B] $\frac{\pi}{3}, \frac{5\pi}{3}$ [C] π [D] $\frac{2\pi}{3}$

86. Use inverse functions where needed to find all solutions of the equation in the interval $[0, 2\pi)$.

$7\csc^2 x - \cot x - 15 = 0$

[A] $\operatorname{arccot}\left(\frac{8}{7}\right)$, $\operatorname{arccot}\left(\frac{8}{7}\right)+\pi$, $\frac{\pi}{4}$, $\frac{5\pi}{4}$

[B] $\operatorname{arccot}\left(-\frac{7}{8}\right)$, $\operatorname{arccot}\left(-\frac{7}{8}\right)+\pi$, $\frac{\pi}{4}$, $\frac{5\pi}{4}$

[C] $\operatorname{arccot}\left(-\frac{7}{8}\right)$, $\operatorname{arccot}\left(-\frac{7}{8}\right)+\pi$, $\frac{3\pi}{4}$, $\frac{7\pi}{4}$

[D] $\operatorname{arccot}\left(\frac{8}{7}\right)$, $\operatorname{arccot}\left(\frac{8}{7}\right)+\pi$, $\frac{3\pi}{4}$, $\frac{7\pi}{4}$

87. Find the exact value of the sine, cosine, and tangent of the angle.

$\frac{\pi}{12}$

[A] $\sin\frac{\pi}{12} = -\frac{\sqrt{2}}{4}\left(\sqrt{3}-1\right)$

$\cos\frac{\pi}{12} = -\frac{\sqrt{2}}{4}\left(\sqrt{3}+1\right)$

$\tan\frac{\pi}{12} = -2+\sqrt{3}$

$\cos\frac{\pi}{12} = \frac{\sqrt{2}}{4}\left(\sqrt{3}+1\right)$

$\tan\frac{\pi}{12} = -2+\sqrt{3}$

[B] $\sin\frac{\pi}{12} = \frac{\sqrt{2}}{4}\left(\sqrt{3}-1\right)$

$\cos\frac{\pi}{12} = -\frac{\sqrt{2}}{4}\left(\sqrt{3}+1\right)$

$\tan\frac{\pi}{12} = -2+\sqrt{3}$

[C] $\sin\frac{\pi}{12} = -\frac{\sqrt{2}}{4}\left(\sqrt{3}-1\right)$

$\cos\frac{\pi}{12} = \frac{\sqrt{2}}{4}\left(\sqrt{3}+1\right)$

$\tan\frac{\pi}{12} = 2-\sqrt{3}$

[D] $\sin\frac{\pi}{12} = \frac{\sqrt{2}}{4}\left(\sqrt{3}-1\right)$

$\cos\frac{\pi}{12} = \frac{\sqrt{2}}{4}\left(\sqrt{3}+1\right)$

$\tan\frac{\pi}{12} = 2-\sqrt{3}$

88. Find the exact solutions to the equation in the interval $[0,\ 2\pi)$.

$-3\sin 4x = -3\cos 2x$

[A] $\frac{\pi}{6}, \frac{\pi}{8}, \frac{5\pi}{6}, \frac{3\pi}{4}, \frac{11\pi}{12}, \frac{5\pi}{4}, \frac{7\pi}{4}$

[B] $\frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, 2\pi$

[C] $\frac{\pi}{12}, \frac{\pi}{4}, \frac{5\pi}{12}, \frac{3\pi}{4}, \frac{13\pi}{12}, \frac{5\pi}{4}, \frac{7\pi}{4}$

[D] $\frac{\pi}{3}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$

89. Use the power-reducing formulas to find the exact value of the trigonometric function.

$\cos^2 \frac{3\pi}{8}$

[A] $\frac{4+\sqrt{2}}{4}$ [B] $\frac{4-\sqrt{2}}{4}$ [C] $\frac{2+\sqrt{2}}{4}$ [D] $\frac{2-\sqrt{2}}{4}$

90. Use the half-angle formulas to simplify the expression.

$-\sqrt{\frac{1+\cos 4x}{1-\cos 4x}}$

[A] $-|\cot 2x|$ [B] $-|\tan 2x|$ [C] $\tan 2x$ [D] $\cot 2x$

91. Find all solutions in the interval $[0,\ 2\pi)$.

$\cos 6x - \cos 2x = 0$

[A] $0, \frac{\pi}{4}, \frac{\pi}{2}, \frac{3\pi}{4}, \pi, \frac{3\pi}{2}$

[B] $0, \frac{\pi}{8}, \frac{3\pi}{8}, \frac{\pi}{2}, \frac{5\pi}{8}, \frac{7\pi}{8}, \pi, \frac{9\pi}{8}, \frac{11\pi}{8}, \frac{3\pi}{2}, \frac{13\pi}{8}, \frac{15\pi}{8}$

[C] $\frac{\pi}{8}, \frac{\pi}{4}, \frac{3\pi}{8}, \frac{5\pi}{8}, \frac{3\pi}{4}, \frac{7\pi}{8}, \frac{9\pi}{8}, \frac{5\pi}{4}, \frac{11\pi}{8}, \frac{13\pi}{8}, \frac{7\pi}{4}, \frac{15\pi}{8}$

[D] $0, \frac{\pi}{4}, \frac{\pi}{2}, \frac{3\pi}{4}, \pi, \frac{5\pi}{4}, \frac{3\pi}{2}, \frac{7\pi}{4}$