BC summer work

Due first day of school

(1) _____ The slope of the line $3x - 4y + 8 = 0$ is

(a) $m = -4$ (b) $m = 3$

(c) $m = 3/4$ (d) $m = 4/3$

(2) _____ The domain of the function $f(x) = \ln(2x - 1)$ is

(a) all real numbers. (b) all real numbers except $x = 0$.

(c) the set $x > 0$. (d) the set $x > 1/2$.

(3) _____ If a rational function f is known to have a vertical asymptote at $x = a$ and a removable singularity at $x = b$, which of the following formulas could represent f?

(a) $f(x) = \dfrac{(x+a)^2(x+b)}{(x+a)^3(x+b)}$ (b) $f(x) = \dfrac{(x+a)}{(x+a)(x+b)}$

(c) $f(x) = \dfrac{(x-a)(x-b)}{(x-a)(x-b)^2}$ (d) $f(x) = \dfrac{(x-a)(x-b)^2}{(x-a)^2(x-b)}$

(4)) _____ If $\text{Arctan}(\tan(\theta)) = \theta$, then we know that

(a) $-\pi/2 < \theta < \pi/2$ (b) $0 < \theta < \pi$

(c) $-\pi/2 < \theta < \pi$ (d) $-\pi < \theta < \pi$

(5) _____ If $f(x) = 1 + \sin(3x - \pi/2)$, then one solution to the equation $f(x) = 3/2$ is

(a) $x = 5\pi/18$ (b) $x = 2\pi/9$

(c) $x = (60 + \pi)/6$ (d) $x = (20 + \pi)/2$

(6) _____ The slope of the line passing through the points $(-2, 1)$ and $(4, 2)$ is

(a) $m = 1/6$ (b) $m = 2$

(c) $m = -6$ (d) $m = -2$

(7) _____ If the radian measure for an angle θ is $-6\pi/5$, then the degree measure for θ is

(a) $150°$ (b) $-216°$

(c) $36°$ (d) $-150°$

(8) _____ If a rational function f is known to have a horizontal asymptote at $y = 3$, which of the following formulas could represent f?

(a) $f(x) = x + 3 + \dfrac{1}{x^2+3}$ (b) $f(x) = 3 - \dfrac{x+1}{x^2+3}$

(c) $f(x) = \dfrac{3}{(x-1)(x-2)^2}$ (d) $f(x) = 3x + \dfrac{x-3}{x+3}$

(9) _____ Suppose A is in degree measure. We know that $\sin(A + 720°)$ is equal to

(a) $\sin(A)$ (b) $\cos(A)$

(c) $-\sin(A)$ (d) $-\cos(A)$

(10) _____ The domain of the function $f(x) = e^{2x-1}$ is

(a) all real numbers. (b) all real numbers except $x = 0$.

(c) the set $x > 0$. (d) the set $x > 1/2$.

(11) _____ Let $a > 0$. If we know that $b = a^c$, then we also know

(a) $b = \log_c(a)$ (b) $a = \ln(b)$

(c) $c = \log_a(b)$ (d) $b = \ln(a)$

(12) _____ The slope of any line perpendicular to the line $y = -5x + 8$ will be

(a) $m = 1/5$ (b) $m = 5$

(c) $m = -5$ (d) $m = -1/5$

(13) _____ If a parabola is known to have a minimum at the point $(-3, 5)$, which of the following formulas could represent the parabola?

(a) $f(x) = (x - 3)^2 + 5$ (b) $f(x) = (x - 5)^2 + 3$

(c) $f(x) = -2(x + 3)^2 + 5$ (d) $f(x) = 5(x + 3)^2 + 5$

(14) _____ Suppose A is in radian measure. We know that $\cos(\pi/2 - A)$ is equal to

(a) $\cos(A)$ (b) $\sin(A)$

(c) $-\sin(A)$ (d) $-\cos(A)$

(15) _____ An algebraic formula for $y = \cot(\text{Arcsin}(3x/2))$ would be

(a) $y = \dfrac{2}{3x}$ (b) $y = \dfrac{3x}{2}$

(c) $y = \dfrac{\sqrt{4 - 9x^2}}{3x}$ (d) $y = \dfrac{2}{2 - 3x}$

(16) _____ Suppose A is in degree measure. We know that $\sin(A - 90°)$ is equal to

(a) $\cos(A)$ (b) $\sin(A)$

(c) $-\sin(A)$ (d) $-\cos(A)$

(17) _____ If the point $(3, 4)$ lies on the graph of an invertible function f, then which of the following points lies on the graph of its inverse?

(a) the point $(4, 3)$ (b) the point $(3, -4)$

(c) the point $(3, 1/4)$ (d) the point $(-3, 4)$

(18) _____ The line parallel to $y = 5x + 8$ having y-intercept $(0, 4)$ has the formula

(a) $y = -(1/5)x - 4$ (b) $y = (1/5)x + 4$

(c) $y = 5x + 4$ (d) $y = -5x + 12$

(19) _____ If a is a real number, then we know that $a^{4/5}$ is equal to

(a) $\sqrt[5]{a^4}$ (b) $\sqrt[4]{a^5}$

(c) $(\sqrt[5]{a})^5$ (d) $\left(\frac{1}{a^5}\right)^4$

(20) _____ If we know that $\sec(\theta) = -5/4$, then we also know that

(a) $\cos(\theta) = -4/5$ (b) $\sin(\theta) = -4/5$

(c) $\tan(\theta) = 5/4$ (d) $\cot(\theta) = 5/4$

(21) _____ Let f be a function defined at $x = a$ and $x = b$. The average rate of change for f between $x = a$ and $x = b$ is

(a) $\frac{f(a) - f(b)}{b - a}$ (b) $\frac{f(b) - f(a)}{b - a}$

(c) $\frac{f(a + b) - f(b)}{a - b}$ (d) $\frac{f(b) - f(b - a)}{a}$

(22) _____ The inverse of the function $f(x) = 7x + 8$ will be

(a) $g(x) = (x - 8)/7$ (b) $g(x) = 1/(7x + 8)$

(c) $g(x) = 8/(x - 7)$ (d) $g(x) = -7x - 8$

(23) _____ If $\sin(A) < 0$ and $\tan(A) < 0$, then

(a) $\cos(A) = -\sqrt{1 - \sin^2(A)}$ (b) $\cos(A) = \sqrt{1 - \sin^2(A)}$

(c) $\cos(A) = \sqrt{\sin^2(A) - 1}$ (d) $\cos(A) = -\sqrt{\sin^2(A) - 1}$

Problems 24-26 refer to the following function.

$$f(x) = \begin{cases} 3 & \text{if } x < 2 \\ x - 1 & \text{if } 2 < x \leq 4 \\ 2x - 5 & \text{if } 4 < x \end{cases}$$

(24) _____ The value of $f(0)$ is

(a) undefined (b) 3

(c) 0 (d) -1

(25) _____ The value of $f(2)$ is

(a) undefined (b) 3

(c) 1 (d) -1

(26) _____ The formula $x - 1$ is valid on the interval

(a) $[2, 4)$ (b) $[2, 4]$

(c) $(2, 4)$ (d) $(2, 4]$

(27) _____ If a function f is symmetric with respect to the y-axis and (a, b) lies on the graph of f, then

(a) $(a, -b)$ lies on the graph of f. (b) $(-b, a)$ lies on the graph of f.

(c) $(-a, -b)$ lies on the graph of f. (d) $(-a, b)$ lies on the graph of f.

(28) _____ If $f(x) = \sqrt{x}$ and $g(x) = x^2$, then $(gf)(x)$ is equal to

(a) $\sqrt{x}/x$ (b) $|x|$

(c) $x^2\sqrt{x}$ (d) x

(29) _____ A street lamp rises vertically from a level sidewalk. When a five-foot woman stands eight feet from the base of the lamp, she casts a ten foot shadow. The depression angle between the light and the tip of her shadow is

(a) exactly 30°. (b) approximately 26.6°.

(c) approximately 63.4° (d) exactly 45°.

Problems 30-33 refer to the function $f(x) = 2 + \cos\left[3x - \frac{\pi}{2}\right]$.

(30) _____ The period of the function f is

(a) 2π (b) 3

(c) $2\pi/3$ (d) 2

(31) _____ Compared to the basic cosine function, the horizontal translation of f is

(a) $\pi/2$ units right. (b) $\pi/6$ units right.

(c) 2 units left. (d) 3 units left.

(32) _____ The amplitude of the function f is

(a) π. (b) 3.

(c) 2. (d) 1.

(33) _____ In an interval of width 2π, the function f will complete

(a) three oscillations. (b) two oscillations.

(c) one oscillation. (d) π oscillations.

(34) _____ If $f(x) = x^2 - 3$, then $(f \circ f)(2)$ is equal to

(a) 1 (b) -2

(c) $2(x^2 - 3)^2$ (d) $2(x^2 - 3)^2 - 6$

(35) _____ The maximum value of $f(x) = -3 + 4\cos(2x + \pi)$ is

(a) -3. (b) 2.

(c) 1. (d) 4.

(36) _____ A radio tower rises vertically from a stretch of level ground. A support cable strung taut from the top of the tower makes a 40° angle with the ground. If the cable is three hundred feet long, approximately how tall is the tower?

(a) 171 feet (b) 252 feet

(c) 230 feet (d) 193 feet

(37) _____ The reference angle for $\theta = 330°$ is

(a) $A = -60°$ (b) $A = 150°$

(c) $A = 60°$ (d) $A = 30°$

(38) _____ The laws of logarithms tells us that $\log(x-1) - \log(x-2)$ is equal to

(a) $\dfrac{x-1}{x-2}$ (b) $\dfrac{\log(x-1)}{\log(x-2)}$

(c) $\log\left[\dfrac{x-1}{x-2}\right]$ (d) $-\log[(x-1)(x-2)]$

(39) _____ A tire of radius three feet rolls along the ground at an angular speed of 4 radians per second. In six seconds, the tire will roll

(a) 72 feet (b) 12 feet

(c) 36π feet (d) 24π feet

(40) _____ If the point $(3, 2)$ lies on the graph of $f(x) = \log_a(x)$, then we know

(a) $a^2 = 3$ (b) $a^3 = 2$

(c) $3^a = 2$ (d) $a = 3/2$

(41) _____ Let θ be an angle in standard position and suppose (a, b) is a point on the terminal side of θ a positive distance r from the origin. We know that

(a) $\cot(\theta) = y/x$ (b) $\sec(\theta) = x/r$

(c) $\tan(\theta) = x/y$ (d) $\csc(\theta) = r/y$

(42) _____ A tire rolls 4π feet when it is rotated through an angle of $240°$. The radius of the tire is

(a) $\pi/5$ feet (b) $4/\pi$ feet

(c) 3 feet (d) 4 feet

(43) _____ If we know θ lies in Quadrant IV, then which of the following statements is correct?

(a) $\sin(\theta) = \sqrt{1-\cos^2(\theta)}$ (b) $\sin(\theta) = -\sqrt{1-\cos^2(\theta)}$

(c) $\cos(\theta) = 1 - \sin(\theta)$ (d) $\cos^2(\theta) = \sin^2(\theta) - 1$

(44) _____ We know that $\log_4(10)$ is approximately

(a) 0.602 (b) 1.661

(c) 2.303 (d) 1.386

(45) _____ If we know θ lies in Quadrant II and $\cos(\theta) = -3/5$, then we also know that $\sin(\theta)$ is equal to

(a) $4/5$ (b) $-4/5$

(c) $1/3$ (d) $3/5$

(46) _____ The equation $\log(2x-5) = 8$ is equivalent to

(a) $2x - 5 = e^8$ (b) $2x - 5 = 8$

(c) $e^{2x-5} = e^8$ (d) $2x - 5 = 10^8$

(47) _____ We have $\ln[(1-2x)^2] = 2\ln(1-2x)$

(a) for $x < 1/2$. (b) for all x.

(c) for $x \neq 1/2$. (d) for $x > 0$.

(48) _____ If $f(x) = x^2 - 1$, then the formula which gives the average rate of change for f on the interval $a \le x \le a + h$ is

(a) $y = a$ (b) $y = \dfrac{a^2 - 1}{h}$

(c) $y = 2a + h$ (d) $y = \dfrac{2h - a^2}{a}$

(49) _____ If we write $y = \ln(x\sqrt{x^2 - 1})$ as a sum of natural logs, we obtain

(a) $\ln(x) + \ln(x) - \ln(1)$ (b) $\ln(x) + (1/2)\ln(x - 1)$

(c) $\ln(x) + (1/2)\ln(x + 1) + (1/2)\ln(x - 1)$ (d) $(1/2)\ln(x) + \ln(x) + (1/2)\ln(-1)$.

(50) _____ If $f(x) = 5 + 3\cos[4(x - 1)]$ and a is any real number, then which of the following must equal $f(a)$?

(a) $f(a + 3\pi/2)$ (b) $f(a + \pi/4)$

(c) $f(a + 8)$ (d) $f(a - 4)$

(51) _____ The terminal side of $\theta = 23\pi/3$ lies in

(a) Quadrant I (b) Quadrant II

(c) Quadrant III (d) Quadrant IV

(52) _____ The method for solving $\log_2(x) + \log_2(x + 1) = 1$ yields two possible solutions, namely $x = 1$ and $x = -2$. From this, we know

(a) both $x = 1$ and $x = -2$ are solutions. (b) only $x = 1$ is a solution.

(c) only $x = -2$ is a solution. (d) neither $x = 1$ nor $x = -2$ is a solution.

(53) _____ The function $f(x) = \dfrac{5x^2 - 3x + 1}{x - 3}$ has slant asymptote

(a) $y = 5x$ (b) $y = -3x$

(c) $y = 3$ (d) $y = 5x + 12$

(54) _____ Suppose an ant is sitting on the perimeter of the unit circle at the point (0,-1). If the ant travels a distance of $2\pi/3$ units in the clockwise direction, then the coordinates of the point where the ant stops will be

(a) $(\sqrt{3}/2, 1/2)$ (b) $(-1/2, \sqrt{3}/2)$

(c) $(1/2, \sqrt{3}/2)$ (d) $(-\sqrt{3}/2, 1/2)$

(55) _____ The function $y = \dfrac{x^2 - 1}{x^2 - x - 2}$ has a vertical asymptote

(a) at $x = -1$ and $x = 2$. (b) only at $x = 2$.

(c) only at $x = 1$. (d) only at $x = -1$.

(56) _____ The average rate of change for $f(x) = 1 + \sqrt{x}$ on the interval $[1, 4]$ is

(a) 1/3. (b) 1/2.

(c) 0. (d) 2/3.

57. Evaluate $\cos(\arcsin(-2x))$.

58. Simplify: (a) $\tan^4 x + 2\tan^2 x + 1$

(b) $\dfrac{\cos x}{\sec x} + \dfrac{\sin x}{\csc x}$

59. Solve this equation algebraically: $\cos^2 x - \cos 2x + \sin x = -\sin^2 x$, and give answers on the interval $[0,2\pi)$.

60. Graph $y = -\dfrac{3}{2}\sin(2x) + 1$.

61. Graph $r = 2\sin\theta$.

62. Convert:

(a) $(r,\theta) = (-2, \frac{11\pi}{6})$ to rectangular coordinates

63. Graph the following polar equations without a table of values:

(a) $r = 2.5$

(b) $\theta = \dfrac{3\pi}{4}$

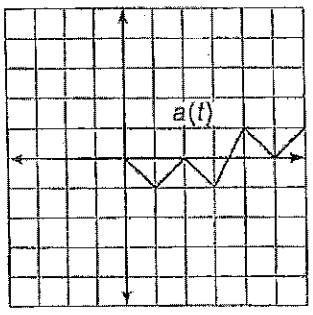
(c) $r = \csc\theta$

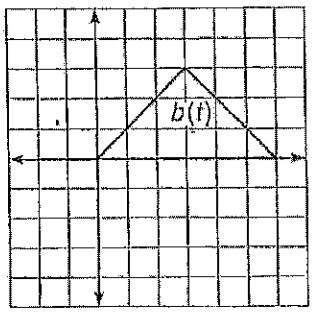
64. Draw the graphs of the following parametric equations and rewrite each in rectangular form:

(a) $x = 3\cos\theta, y = 2\sin\theta$

(b) $x = t - 1, y = 2 - \dfrac{2}{t}$

65. Given the graphs below, draw the graph of the parametric equations $x = a(t)$, $y = b(t)$.





66. Find the parametric equations whose graph is an ellipse centered at the origin with horizontal major axis of length 8 and minor axis of length 4.