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MATHEMATICS SECTION EXAM 1: ALGEBRA I, SECTIONS 1-3

1. Find x: $4x - 6 = 9x + 5$.

   a. $x = -2.2$
   b. $x = 1.4$
   c. $x = 2.6$
   d. $x = -1$
   e. $x = -0.2$

2. Which of the following is NOT a property of the real numbers?

   a. When two real numbers are added, the result is always a real number.
   b. For any real number x, $x \cdot 1 = x$.
   c. For any real number x, there is a unique number $-x$, such that $x + (-x) = 0$.
   d. Every real number can be represented by a ratio of two integers.
   e. For all real numbers x and y, $x \cdot y = 0$ if and only if $x = 0$ or $y = 0$.

3. Simplify: $\frac{4+17i}{1-2i}$

   a. $4 + 4i$
   b. $-8 - 3i$
   c. $5 - 2i$
   d. $10 + 7i$
   e. $-6 + 5i$

4. What is $(4x^4 - x^2 + 10x + 3) - (3x^3 + 11x^2 - 5x - 5)$?

   a. $4x^4 + 3x^3 + 10x^2 + 5x + 8$
   b. $4x^4 - 3x^3 - 12x^2 + 15x + 8$
   c. $4x^4 - 3x^3 - 2x^2 + x + 8$
   d. $4x^4 + 3x^3 + 11x^2 + 9x + 8$
   e. $4x^4 - 4x^3 - 11x^2 + 15x + 8$

5. Find the positive solution: $4x^2 + 5x - 6 = 0$.

   a. $x = 0.75$
   b. $x = 2$
   c. $x = 0.5$
   d. $x = 3$
   e. no real solution

6. What is the remainder when $2x^5 - 5x^4 + x^2 + 6x + 1$ is divided by $x - 3$?

a. 107
b. 108
c. 109
d. 110
e. 111

7. What is the complex conjugate of $-7 + 3i$?

a. $7 + 3i$
b. $\frac{1}{-7+3i}$
c. $-7 - 3i$
d. $-\frac{1}{7} + \frac{1}{3}i$
e. $\sqrt{58}$

8. Which of the following represents the Commutative Law of Multiplication?

a. no such property for multiplication
b. $x \cdot (y + z) = x \cdot y + x \cdot z$
c. $x \cdot 1 = x$
d. $x \cdot (y \cdot z) = (x \cdot y) \cdot z$
e. $x \cdot y = y \cdot x$

9. If $5x - 3y = 2$ and $-9x + 7y = 12$, then what is $x + y$?

a. 16
b. 17
c. 18
d. 19
e. 20

10. Simplify: $\frac{5x^4-19x^3+31x^2-133x-28}{x^3-4x^2+7x-28}$

a. $\frac{x^2+7}{x-1}$
b. $5x + 1$
c. $5x^3 + 4x^2 + 1$
d. $\frac{1}{x^2-4x+4}$
e. cannot be simplified further

11. What is $(4-5i)(2+i)(-2i)$?

a. $2-12i$
b. $-14-10i$
c. $-9+2i$
d. $-12-26i$
e. $6-18i$

12. Which of the following is NOT a zero of $P(x)=12x^4-82x^3+168x^2-62x-84$?

a. $-\frac{1}{2}$
b. 2
c. $\frac{7}{3}$
d. -4
e. 3

13. Which of the following is NOT a rational number?

a. $\frac{19}{7}$
b. $\sqrt{2}$
c. -3
d. 0.194058
e. 9.2

14. Solve for x: $x^2-6x=-10$.

a. $x=3\pm i$
b. $x=2+i,-3-i$
c. $x=-5+i,2-i$
d. $x=\frac{4}{3}\pm 2i$
e. $x=i,1+1$

15. What is the absolute value of $6-i$?

a. $\sqrt{37}$
b. $6+i$
c. 5
d. $\sqrt{7}$
e. 6

16. If $3x^2-6x+1$ is written in the form $k(x+r)^2-p$, then what is the value of p?

a. 1
b. 2
c. 3
d. 4
e. 5

17. Which of the following is the discriminant of the equation $ax^2 + bx + c = 0$?

a. $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
b. a
c. $\sqrt{a^2 + b^2 + c^2}$
d. 0
e. $b^2 - 4ac$

18. Dean chose a number, added 3 to it, divided the result by 5, and then subtracted 11 from that result. Sam chose a different number, multiplied it by 6, added 1 to it, and got 79. If the sum of Sam's original number and Dean's final result is 280, then what was Dean's original number?

a. 201
b. 1057
c. 1387
d. 349
e. 782

19. What is the coefficient of x^3 in the expansion of $(2x^2 - 3x + 1)(x^4 - x^3 + 5x + 6)$?

a. 11
b. 2
c. 17
d. 9
e. 4

20. Using the Rational Root Theorem, which of the following is a POSSIBLE root for $4x^4 - 2x^2 + x + 3$?

a. 4
b. $\frac{2}{3}$
c. $\frac{3}{2}$
d. 2
e. $\frac{1}{3}$

21. When $3x^3 + 4x^2 - ax + 1$ is divided by $x - 3$, the remainder is 7. What is a?

a. 34
b. 35
c. 36
d. 37
e. 38

22. Lydia and Allison are painting a fence together. Working by herself, Allison can paint the fence in two hours. Doing it together, they manage to paint the fence in just an hour and twenty minutes. How long would it have taken Lydia to paint the fence by herself?

a. 3.5 hours
b. 4 hours
c. 2.5 hours
d. 3 hours
e. 2 hours

23. If $\frac{(5+2i)-(4+3i)(-9-i)}{(2+i)}$ is written in the form $a + bi$, what is the value of $a + b$?

a. 27.4
b. 23.8
c. 17.5
d. 9.2
e. 10

24. Which of the following is NOT a subset of $\mathbb{R}$?

a. $\mathbb{Z}^-$
b. $\mathbb{Q}$
c. $\mathbb{C}$
d. $\mathbb{Z}$
e. All of the above are subsets of $\mathbb{R}$

25. At the beginning of the day Stiles had \$45. For lunch he bought *x* cookies and each one cost him *x* dollars. Then, on his way home he bought *x* cupcakes, each priced at \$6. At the end of the day, he only had \$29 left. Assuming these were the only purchases he made that day, how many cookies did he buy for lunch?

a. 1
b. 2
c. 3
d. 4
e. 5

26. Find the imaginary solutions to the equation $5x^4 - 13x^3 + 119x^2 - 325x - 150=0$.

a. $x = \pm 5i$
b. $x = -3 \pm 3i$
c. $x = \pm i$
d. $x = 2 \pm i$
e. no imaginary solutions

27. Evaluate: $\left|\frac{8-3i}{4.2+i}\right|$

a. .832
b. 1.979
c. 1.551
d. 2.050
e. 1.348

28. Which of the following sets are closed under addition?

a. $\mathbb{R}$ only
b. $\mathbb{Z}$ only
c. $\mathbb{Q}$ only
d. $\mathbb{R}$ and $\mathbb{Z}$ only
e. $\mathbb{R}$, $\mathbb{Z}$, and $\mathbb{Q}$

29. Which of the following polynomial equations has $x = 2$ as one solution?

a. $2x^4 - x^3 + 2x^2 + x + 3 = 0$
b. $x^4 + 5x^3 - x^2 + 7x = 0$
c. $x^4 - x^3 + x^2 - 4x + 2 = 0$
d. $3x^4 - 9x^3 - 6x^2 + 36x - 24 = 0$
e. $4x^4 - 2x^3 + 9x - 12 = 0$

30. How many real solutions are there to the equation $2x^3 - 3x^2 + 14x - 21 = 0$?

a. 0
b. 1
c. 2
d. 3
e. more than 3

31. Rory has *x* apples. He eats four of them, then divides what's left into three piles. Each pile has 10 apples in it, with two left over. How many apples did he start with?

a. 33
b. 34
c. 35
d. 36
e. 37

32. In the complete expansion of $(4x + 2)(x - 3)(x^2 + 7)(3x + 1)$, what is the coefficient of the x^2 term?

a. 82
b. -61
c. -188
d. 20
e. -107

33. If $\frac{x^4-3x^3+2x-9}{x^2-2x+3}$ is written in the form $\mathrm{Q}(x)(x^2-2x+3)+\mathrm{R}(x)$, then what is the quotient?

a. x^2-2x+3
b. x^2-x-5
c. $-5x+6$
d. $2x+1$
e. x^2+6x-2

34. Which of the following is NOT a property of the real numbers?

a. For any three real numbers *x, y,* and *z,* if $x<y$ and $z<0$, then $zx<zy$.
b. For any two real numbers *x* and *y*, one and only one of the following is true: $x<y, x=y$, or $y<x$.
c. For any three real numbers *x, y,* and *z,* if $x<y$ and $y<z$, then $x<z$.
d. For any three real numbers *x, y,* and *z,* if $x<y$, then $x+z<y+z$.
e. For any real number *x*, $x\cdot 0=0$.

35. If you take a complex number in the form $a+bi$ and divide it by its absolute value and then multiply the result by the complex conjugate of $a+bi$, what is your final result in terms of a and b?

a. $\frac{a^2+b^2}{a-bi}$
b. $\sqrt{a+bi}$
c. $\frac{a+bi}{a-bi}$
d. $a+bi$
e. $\sqrt{a^2+b^2}$

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MATHEMATICS SECTION EXAM 2: ALGEBRA II, SECTIONS 4-5

1. What is the domain of the function $f(x) = \frac{7}{3x+4}$?

   a. $\mathbb{R}$
   b. $x \neq -\frac{4}{3}$
   c. $x \neq 0$
   d. $\mathbb{R}^+$
   e. $x \neq 4$

2. What is the inverse function of $f(x) = 4x^2 - 3$?

   a. $f^{-1}(x) = \frac{\sqrt{x+3}}{2}$
   b. $f^{-1}(x) = 4(x+3)^2$
   c. $f^{-1}(x) = \sqrt{2}(x-3)$
   d. $f^{-1}(x) = \frac{3-4x^2}{2}$
   e. The given function has no inverse function.

3. Equations can be classified as either one-to-many, many-to-one, or one-to-one. Which of these classifications can functions fall under?

   a. many-to-one only
   b. one-to-one only
   c. many-to-one and one-to-many only
   d. one-to-one and many-to-one only
   e. one-to-one, one-to-many, and many-to-one

4. If $f(x) = 2x - 1$ and $g(x) = \frac{1}{2}x^2$, then what is the value of $f(g(2))$?

   a. 3
   b. 4
   c. 5
   d. 6
   e. 7

5. Find the inverse of the function $f(x) = 5 - 3^{x+1}$.

   a. $f^{-1}(x) = log_3(5-x) - 1$
   b. $f^{-1}(x) = log_{x+1}(5)$
   c. $f^{-1}(x) = log_x(3) + 5$
   d. $f^{-1}(x) = log_3(x+1) - 5$
   e. The given function has no inverse function.

6. What is the axis of symmetry of the graph of $f(x) = 2x^2 - 3x + 1$?

a. $y = 0$
b. $x = 0$
c. $x = \frac{3}{4}$
d. $y = -\frac{1}{8}$
e. The given function has no axis of symmetry.

7. What is the range of the function $y = \sqrt{x - 2} + 7$?

a. $y \neq 0$
b. $y \geq 7$
c. $\mathbb{R}$
d. $y \geq 2$
e. $\mathbb{R}^+$

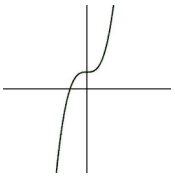
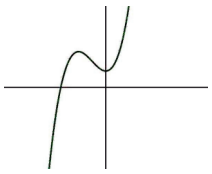
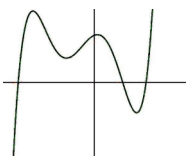
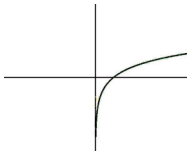
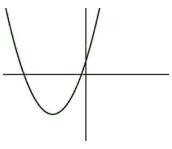
8. What is the minimum y-value of the graph of $f(x) = \frac{1}{3}x^2 + 4x + 1$?

a. -6
b. 1
c. $-\frac{4}{3}$
d. -11
e. 4

9. What is the x-intercept of the general equation $f(x) = ax + b$?

a. $(-\frac{b}{a}, 0)$
b. $(0,0)$
c. $(b, 0)$
d. $(ab, 0)$
e. cannot be found without the actual equation

10. Which of the following could be the graph of $f(x) = x^3 + b$?

a. 
b. 
c. 
d. 
e. 

11. What are the domain and range of the function $y = \frac{x}{2x-1}$?

a. domain: $\mathbb{R}$, range: $\mathbb{R}$
b. domain: $x \neq \frac{1}{2}$, range: $\mathbb{R}$
c. domain: $x \neq 0$, range: $y \geq 0$
d. domain: $x \neq 0$, range: $y \neq 0$
e. domain: $x \neq \frac{1}{2}$, range: $y \neq \frac{1}{2}$

12. Which of the following functions does NOT have an inverse function?

a. $f(x) = 2^x$
b. $f(x) = x^2 + 5$
c. $f(x) = 4x - 2$
d. $f(x) = log_3(2x + 1)$
e. $f(x) = \frac{2}{x-9}$

13. Let $f(x) = x - 2,\ g(x) = (2x + 1)^2$, and $h(x) = \frac{x}{4}$. What is $g\left(f\left(h(x)\right)\right)$?

a. $2(x - 2)^2 - 1$
b. $2x^2 + x - 1$
c. $(\frac{x}{2} - 3)^2$
d. $\frac{(2x-4)^2}{4}$
e. $(4x - 1)^2$

14. Let $f(x) = 2log_5(x - 1)$. Find $f^{-1}(x)$.

a. $f^{-1}(x) = 2^{5x-5}$
b. $f^{-1}(x) = 5^{2x} - 1$
c. $f^{-1}(x) = \frac{(x-1)^5}{2}$
d. $f^{-1}(x) = 5^{\frac{x}{2}} + 1$
e. $f^{-1}(x) = 5(x - 1)^2$

15. In the quadratic $f(x) = ax^2 + bx + c$, $a = -1$ and $b = 5$. At what x-value does this function have a maximum?

a. $x = \frac{5}{2}$
b. $x = -2$
c. $x = \frac{1}{5}$
d. $x = -5$
e. This cannot be determined without also knowing the value of c.

16. If the graph of $y = x^2$ is shifted up by 7 and then to the left by 2, what is the equation of the new graph?

a. $y = (x-2)^2 + 7$
b. $y = (x+7)^2 + 2$
c. $y = (x+2)^2 + 7$
d. $y = (x-7)^2 + 2$
e. The two equations are unrelated.

17. Let $f(x) = (x+1)^2 + 2$ and $g(x) = ax + 4$. If $f(g(2)) = 6$, then what is the greatest possible value of a?

a. $a = 4$
b. $a = -\frac{7}{2}$
c. $a = -2$
d. $a = \frac{2}{5}$
e. $a = -\frac{3}{2}$

18. What is the vertex of the function $f(x) = \frac{1}{2}x^2 - 3x + 8$?

a. $(-3, \frac{1}{2})$
b. $(3, \frac{7}{2})$
c. $(-\frac{4}{3}, 2)$
d. $(8, -3)$
e. $(2, 3)$

19. Which of the following functions is many-to-one?

a. $f(x) = \frac{8}{3}x - 2$
b. $f(x) = \frac{\sqrt{x-6}}{2}$
c. $f(x) = 6^{2x} + 1$
d. $f(x) = (x-3)^2$
e. $f(x) = \frac{4}{x}$

20. Let $a > 0$. What is the range of the general quadratic function $y = ax^2 + bx + c$?

a. $y \geq \frac{-b^2+4ac}{4a}$
b. $\mathbb{R}$
c. $y \geq -\frac{b}{2a}$
d. $y \geq 0$
e. The range cannot be found without knowing the exact function.

21. What is the domain of the function $f(x) = 3 - \sqrt{5x + 2}$?

a. $x \leq 3$
b. $\mathbb{R}$
c. $x \geq -\frac{2}{5}$
d. $x \neq 0$
e. $x \geq -2$

22. Let $f(x) = \frac{3}{x-1}$ and $g(x) = 3(2x + 1)^2 - 2$. Find $f\big(g(3)\big) \cdot g\big(f(3)\big)$.

a. 2116
b. $\frac{1}{2304}$
c. $\frac{56}{3}$
d. $\frac{23}{24}$
e. 579

23. Which of the following functions has $y = \frac{(4x-4)^2}{3} + 1$ as its inverse?

a. $f(x) = \frac{\sqrt{4x-4}}{x} - 1$
b. $f(x) = \frac{\sqrt{x-1}}{2} - 4$
c. $f(x) = \frac{\sqrt{3x-3}}{4} + 1$
d. $f(x) = \frac{\sqrt{x-3}}{4} + 1$
e. $f(x) = \frac{\sqrt{3x+3}}{2} - 3$

24. What is the range of the function $y = x^3 - 4x^2 + x + 4$?

a. $y \neq 0$
b. $\mathbb{R}$
c. $y \neq 4$
d. $y \leq -\frac{1}{4}$
e. $y \geq 2$

25. What kind of function is $f(x) = \sqrt{x - \frac{1}{2}} + 2$?

a. one-to-one
b. many-to-one
c. one-to-many
d. one-to-one if $x > \frac{1}{2}$, otherwise many-to-one
e. none of the above, since this is not actually a function

26. What is the maximum number of times the graph of the function $f(x) = ax^3 + bx^2 + cx + d$ can cross the x-axis?

a. 0
b. 1
c. 2
d. 3
e. There is no maximum.

27. Let $f(x) = \frac{4(x-3)^2}{x}$ and $g(x) = 4 - 3^{3x-1}$. Find $f(g(1)$.

a. -12.6
b. 34.0
c. 65.4
d. -51.2
e. -41.6

28. For what values of a is the function $f(x) = log_a(x)$ a one-to-one function?

a. $\mathbb{R}$
b. $a > 0$
c. $\mathbb{Z}$
d. $a \neq 0$
e. The given function is never one-to-one.

29. What is the axis of symmetry of the graph of the function $f(x) = \frac{(5x+3)^2}{4} - 1$?

a. $x = -\frac{5}{8}$
b. $x = -4$
c. $x = -\frac{3}{5}$
d. $x = \frac{5}{3}$
e. $x = \frac{1}{4}$

30. What is the domain of the function $f(x) = 4log_4(3x - 2) + 9$?

a. $x > 0$
b. $x > \frac{2}{3}$
c. $x > \frac{9}{4}$
d. $x \neq 2$
e. $\mathbb{R}$

31. Given that $f(x)$ is a one-to-one function, for how many values of a is $f(a) = 1$?

a. exactly one
b. at most one
c. at least one
d. finitely many, but more than one
e. infinitely many

32. What are the domain and range of the function $y = 2 + 5^{2x}$?

a. domain: $\mathbb{R}$, range: $\mathbb{R}$
b. domain: $x > 0$, range: $\mathbb{R}$
c. domain: $\mathbb{R}$, range: $y > 2$
d. domain: $x \neq 0$, range: $y > 0$
e. domain: $x > 0$, range: $y > 0$

33. Let $f(x) = \frac{3x-2}{4}$ and $g(x) = ax^2$. If $f\big(g(2)\big) = 4$, then find *a.*

a. $a = 2$
b. $a = \frac{1}{2}$
c. $a = 1$
d. $a = \frac{3}{4}$
e. $a = \frac{3}{2}$

34. Let $f(x) = 2x^2 - bx - c$. If $f(1) = -12$, then what is the value of $f^{-1}(-12)$?

a. -6
b. -12
c. 1
d. The given function has no inverse function.
e. There is not enough information given to find the value.

35. Let $f(x) = 2^x$. If the graph of $f^{-1}(x)$ is shifted up 7, then what is the equation of the resulting graph?

a. $y = log_2(x) + 7$
b. $y = 2^x + 7$
c. $y = x^2 + 7$
d. $y = log_2(x + 7)$
e. The equation cannot be determined.

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MATHEMATICS SECTION EXAM 3: ALGEBRA III, SECTIONS 6-8

1. Solve for x: $\frac{4x-2}{x+3} = 6$.

   a. $x = -6$
   b. $x = -7$
   c. $x = -8$
   d. $x = -9$
   e. $x = -10$

2. What is the equation of the line that is the perpendicular bisector of the line segment through the points $(4, 4)$ and $(-2, -6)$?

   a. $y = 5x - 3$
   b. $y = -3x - 8$
   c. $y = -\frac{3}{5}x - \frac{2}{5}$
   d. $y = \frac{3}{5}x - \frac{8}{3}$
   e. $y = -\frac{3}{2}x + 2$

3. Simplify: $\left(\frac{x^2(x^3)^4}{x^7}\right)^2$.

   a. x^{14}
   b. x^2
   c. x^{-7}
   d. x^4
   e. x^{12}

4. What is the midpoint of the line segment with endpoints $(-9, -10)$ and $(-15, -6)$?

   a. $(-12, -8)$
   b. $(-3, -2)$
   c. $(-6, -2)$
   d. $(-4, -7)$
   e. $(-3, -9)$

5. Solve for x: $2^{4x+3} = 4^x$.

a. $x = 2$
b. $x = -\frac{3}{2}$
c. $x = -\frac{5}{3}$
d. $x = \frac{9}{2}$
e. $x = 4$

6. What is the center of the circle with equation $x^2 - 6x + y^2 + 14y + 33 = 0$?

a. $(7, -3)$
b. $(-7, 3)$
c. $(-3, 7)$
d. $(-7, -3)$
e. $(3, -7)$

7. Solve $y = \frac{2^{x-1} \cdot 4}{3}$ for x in terms of y.

a. $x = \frac{log_2(y)-1}{3}$
b. $x = \frac{1}{3} log_2(y) - 1$
c. $x = log_2(3y - 1)$
d. $x = log_2(3y) - 1$
e. $x = 3log_2(y - 1)$

8. What is the area of ΔABC with vertices $(-7,2), (-4,6)$, and $(1,2)$?

a. 16
b. 14
c. 12
d. 10
e. 8

9. Write $(log_2 3) \cdot (log_3 4) \cdot (log_4 5)$ as a single logarithm.

a. $log_3 4$
b. $log_4 2$
c. $log_2 5$
d. $log_3 5$
e. $log_2 6$

10. What is the distance between the points $(2,0)$ and $(17,5)$?

a. $5\sqrt{10}$
b. $4\sqrt{2}$
c. $2\sqrt{2}$
d. $6\sqrt{3}$
e. $10\sqrt{2}$

11. What are the solutions for x if $2x^2 + 8x - 10 > 0$?

a. $x = \mathbb{R}$
b. $x < -1$ or $x > 5$
c. $x > 1$ or $x < -5$
d. $-5 < x < 1$
e. $-1 < x < 5$

12. Solve for x: $\frac{\sqrt{x-5}}{4} = 2$.

a. $x = 65$
b. $x = 66$
c. $x = 67$
d. $x = 68$
e. $x = 69$

13. What values of x satisfy the equation $|3x - 10| = 2$?

a. $x = \pm 4$
b. $x = 3$ or $x = -\frac{1}{2}$
c. $x = \frac{5}{8}$ or $x = -\frac{3}{8}$
d. $x = 2$ or $x = 8$
e. $x = 4$ or $x = \frac{8}{3}$

14. Given that one side of a right triangle has length 12 and another side has length 5, what are the possible lengths of the third side?

a. 13 only
b. 13 or 17
c. 10
d. 17 or $\sqrt{79}$
e. 13 or $\sqrt{119}$

15. Solve for x: $\frac{x-4}{x+3} = \frac{x+1}{x}$.

a. $x = -\frac{3}{8}$
b. $x = 4$
c. $x = -\frac{4}{3}$
d. $x = \frac{1}{5}$
e. $x = 9$

16. What is the radius of the circle with equation $x^2 - 4x + y^2 - 20y + 64 = 0$?

a. 8
b. $5\sqrt{2}$
c. $2\sqrt{10}$
d. $11\sqrt{3}$
e. $\sqrt{39}$

17. Which of the following is NOT a property of exponents?

a. $a^0 = 1$
b. $(ab)^n = a^n \cdot b^n$
c. $a^m \cdot a^n = a^{m+n}$
d. $\frac{a^m}{a^n} = a^{\frac{m}{n}}$
e. $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$

18. What is the perpendicular bisector of a line segment with a slope of 3 and a midpoint at $(-3,4)$?

a. $y = -\frac{1}{3}x + 3$
b. $y = 3x + 13$
c. $y = \frac{1}{3}x + 5$
d. $y = -3x - 5$
e. $y = -\frac{3}{2}x - \frac{1}{2}$

19. Solve for x: $9(3^{3x-5}) = 81^x$.

a. $x = -4$
b. $x = -3$
c. $x = -2$
d. $x = -1$
e. $x = 0$

20. Let ΔABC have vertices at $(-4,2), (8,7),$ and $(-1,3)$. What is the distance from the intersection of the medians of ΔABC and the point $(-5,5)$?

a. 2
b. $\frac{7}{2}$
c. $2\sqrt{5}$
d. $6\sqrt{11}$
e. $\sqrt{37}$

21. Which of the following is equivalent to $4log_3 x + \frac{log_3 4x}{2}$?

a. $9log_3 x$
b. $log_3 2x^{\frac{9}{2}}$
c. $\frac{3^{3^{4x}}}{2}$
d. $log_3(x^4 + 2x)$
e. $2log_3(4x)$

22. Given that $x > 0$, what values of x satisfy the equation $2x^2 + 5x + 3 > 0$?

a. $x = \mathbb{R}$
b. $x > \frac{3}{2}$
c. $x > 0$
d. $x > 1$
e. There are no solutions for x given these conditions.

23. If $5^{3x+2} = 9$, then what is the value of x?

a. $-.618$
b. $.544$
c. $-.981$
d. $-.212$
e. $.089$

24. Which of the following is equivalent to $log_7 11$ under the Change of Base Formula?

a. $log_{11} 7$
b. $\frac{log_3 7}{log_3 11}$
c. $log_4 7 + log_4 11$
d. $\frac{log_{11} 7}{7}$
e. $\frac{log_2 11}{log_2 7}$

25. Solve for x: $|8 - x| = |2x|$.

a. $x = \frac{8}{3}$ or $x = -8$
b. $x = 4$
c. $x = 6$ or $x = -\frac{1}{2}$
d. $x = \frac{16}{5}$
e. $x = -\frac{3}{8}$ or $x = 2$

26. Given that $x > 0$, solve for x: $\sqrt[3]{(2x-6)^2} - \sqrt[3]{(2x-6)} - 6 = 6$.

a. $x = 35$
b. $x = 36$
c. $x = 37$
d. $x = 38$
e. $x = 39$

27. What values of x satisfy the inequality $4x - 9 > 3$?

a. $x > 2$
b. $x > \frac{5}{4}$
c. $x > 0$
d. $x > -\frac{3}{2}$
e. $x > 3$

28. Solve for x: $2^{\frac{1}{3}x+2} = 128$.

a. $x = 12$
b. $x = 13$
c. $x = 14$
d. $x = 15$
e. $x = 16$

29. What is the graph of the set of all points that are 6 units away from the point $(-1,1)$?

a. a line
b. a parabola
c. a circle
d. a dotted line
e. a semi-circle

30. If (0,0), (1,7), and (4,3) are three vertices of a parallelogram and the fourth vertex is in the first quadrant, then what is the fourth point?

a. (8,6)
b. (5,10)
c. (3,11)
d. (7,10)
e. (8,5)

31. If a right triangle has hypotenuse of length 37 and the other two sides are integers, which of the following could be the length of one of the other two sides?

a. 5
b. 20
c. 21
d. 32
e. 35

32. If $\sqrt{3x-6} > 4$, then which of the following describes the solution set for *x*?

a. $x > \frac{22}{3}$
b. $x > 0$
c. $x > 2$
d. $x > \frac{17}{4}$
e. $x > \frac{10}{3}$

33. Solve for *x*: $5log_6(x-2) = 10$.

a. $x = 34$
b. $x = 35$
c. $x = 36$
d. $x = 37$
e. $x = 38$

34. How many integer values for x satisfy the equation $\left|\frac{4}{7}x - 9\right| < 2$?

a. 2
b. 3
c. 4
d. 5
e. 6

35. Solve the following system of inequalities: $5x + 2 > 0$ and $4 - x > 2$.

a. $x < -\frac{1}{2}$ or $x > 4$

b. $-\frac{5}{3} < x < 3$

c. $-3 < x < \frac{1}{2}$

d. $x < -2$ or $x > 2$

e. $-\frac{2}{5} < x < 2$

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MATHEMATICS SECTION EXAM 4: TRIGONOMETRY I, SECTIONS 9.1-9.7

1. In which quadrants of the coordinate plane is $\sin(x)$ positive?

   a. I only
   b. II only
   c. III only
   d. I and II only
   e. II and III only

2. At 2 pm, a 135-foot tall building casts a 50-foot shadow. Rounded to the nearest degree, what angle does the sunlight make with the ground at that time?

   a. 67
   b. 68
   c. 69
   d. 70
   e. 71

3. ΔABC has side lengths $\overline{AB} = 2x$ and $\overline{AC} = x + 4$. If $\angle A = 30°$ and the triangle has area 6, then what is the length of $\overline{AB}$?

   a. 2
   b. 4
   c. 6
   d. 8
   e. 10

4. $\sin(-x) = ?$

   a. $-\sin(x)$
   b. $\sin(x)$
   c. $-\cos(x)$
   d. $\cos(x)$
   e. $\cos(90 - x)$

5. Which of the following is a correct expression of the tangent function?

   a. $\tan(x) = \frac{\cos(x)}{\sin(x)}$
   b. $\tan(x) = \cos(x)\sin(x)$
   c. $\tan(x) = \frac{1}{\sin(x)}$
   d. $\tan(x) = \frac{\sin(x)}{\cos(x)}$
   e. $\tan(x)$ cannot be expressed in terms of sine and cosine

6. An airplane takes off from the ground at a constant speed of 250 mph. Its flight path makes an angle of 35° with the ground. Ignoring the curvature of the earth and rounded to the nearest mile, how high off the ground is the plane after 2 hours?

a. 119 miles
b. 203 miles
c. 287 miles
d. 350 miles
e. 410 miles

7. If $\cos(y) = a$, then rewrite $\frac{sin(2y)}{2\sin(y)}$ in terms of a.

a. $\frac{1}{a}$
b. a
c. a^2
d. $1 - a$
e. $4a$

8. Which of the following is equivalent to $\tan(2x)$?

a. $\frac{\tan(x)}{1\tan^2(x)}$
b. $\frac{2\tan(x)}{1\tan^2(x)}$
c. $\frac{2\tan(x)}{1\tan(x)}$
d. $\frac{2\tan(x)}{1\tan^2(x)}$
e. $\frac{\tan(x)}{1+\tan(x)}$

9. Simplify: $\frac{\sin(4x)+\sin(2x)}{\sin(3x)}$.

a. $2\cos(x)$
b. $\sin(x)$
c. $\frac{1}{\sin(2x)}$
d. $\cos^2(x)$
e. $\tan(x)$

10. Meg gets onto the bottom seat of a Ferris wheel with a radius of 10 feet that has twelve evenly spaced seats around the outer rim of the wheel and sits 5 feet off the ground. As the wheel starts to rotate, Ruby waits for the seat just behind Meg to reach the bottom of the wheel and gets on. Once Meg has traveled 135° around the wheel's rim, how high off the ground is Ruby?

a. 17. 679 ft
b. 17.145 ft
c. 16.941 ft
d. 16.190 ft
e. 17.588 ft

11. $\cot(x) = ?$

a. $\frac{\cos(x)}{\sin(x)}$
b. $\frac{1}{\cos(x)}$
c. $\sin(x)\cos(x)$
d. $\frac{\sin(x)}{\cos(x)}$
e. $\frac{1}{\sin(x)}$

12. In $\Delta ABC, \angle B = 90°, \angle C = 37°$ and $\overline{\overline{AB}} = 10$. Rounded to the nearest tenth, what is the area of this triangle?

a. 40.9
b. 54.7
c. 66.4
d. 72.1
e. 89.2

13. What is the exact value of $\sin(15°)$?

a. $\frac{\sqrt{6}}{4}$
b. $\frac{\sqrt{6}+\sqrt{2}}{2}$
c. $\frac{\sqrt{3}}{3}$
d. $\frac{\sqrt{6}-\sqrt{2}}{4}$
e. $\frac{\sqrt{3}-\sqrt{2}}{2}$

14. Which of the following trigonometric values CANNOT be calculated exactly?

a. $\sin(105°)$
b. $\cos(175°)$
c. $\sin(150°)$
d. $\tan(210°)$
e. $\cos(75°)$

15. In $\Delta ABC, \angle B = 90°, \angle C = x, \overline{AC} = b, \overline{BC} = a,$ and $\overline{\overline{AB}} = c$. Which of the following equivalences is INCORRECT?

a. $\sin(x) = \frac{c}{b}$
b. $\cot(x) = \frac{a}{c}$
c. $\sec(x) = \frac{b}{c}$
d. $\cos(x) = \frac{a}{b}$
e. $\tan(x) = \frac{c}{a}$

16. Given that $\sin^2(x) = \frac{1}{5}$, what is the exact value of $\cos(x)$?

a. $\pm\frac{\sqrt{3}}{2}$
b. $\pm\sqrt{6}$
c. $\pm\frac{4\sqrt{3}}{5}$
d. $\pm\frac{2\sqrt{5}}{5}$
e. $\pm\frac{3\sqrt{2}}{2}$

17. If an eleven-foot ladder is placed against the side of a building such that it forms a $59°$ angle with the ground, how high up the side of the building is it resting?

a. 9.429 ft
b. 9.591 ft
c. 9.640 ft
d. 9.708 ft
e. 9.882 ft

18. An even function is one that has the property that $f(-x) = f(x)$. Which of the six basic trigonometric functions (sine, cosine, tangent, cotangent, secant, and cosecant) are even?

a. $\sin(x)$ only
b. $\cot(x)$ only
c. $\sin(x)$ and $\cos(x)$
d. $\cos(x)$ and $\sec(x)$
e. $\sin(x)$, $\cos(x)$, and $\tan(x)$

19. Which of the following is equivalent to $\sin(4x)$?

a. $4\sin^2(x)\cos^2(x)$
b. $4\sin(x)\cos(x)$
c. $4\sin(x)\cos^2(x) + 4\sin^2(x)\cos(x)$
d. $4\sin^2(x) - 4\cos^2(x)$
e. $4\sin(x)\cos^3(x) - 4\sin^3(x)\cos(x)$

20. In Circle O, chord $\overline{AB} = 10$. If a radius drawn to A forms a $40°$ with the chord, what is the radius of the circle, rounded to the nearest hundredth?

a. 6.44
b. 6.53
c. 6.67
d. 6.71
e. 6.84

21. In ΔABC, $\angle B = x$, $\overline{BC} = 7$, and $\overline{\overline{AB}} = 8$. If the triangle has area 18, then what is the exact value of $\sin(x)$?

a. $\frac{7}{8}$
b. $\frac{3}{7}$
c. $\frac{9}{14}$
d. $\frac{2}{3}$
e. $\frac{9}{11}$

22. Which of the following is equivalent to $\sin(\frac{x}{2})$?

a. $\pm\sqrt{\frac{1\cos\ (x)}{2}}$
b. $\pm\sqrt{\frac{1+\cos(x)}{2}}$
c. $\pm\sqrt{\frac{1\sin\ (x)}{2}}$
d. $\pm\sqrt{\frac{1+\cos(\frac{x}{2})}{2}}$
e. $\pm\sqrt{\frac{1\sin\ (x)}{2}}$

23. Which of the six basic trigonometric functions are positive in the third quadrant?

a. none are positive
b. $\sin(x)$ and $\csc(x)$
c. $\tan(x)$ and $\cot(x)$
d. $\tan(x)$, $\sin(x)$, and $\cos(x)$
e. $\sin(x)$, $\cos(x)$, $\csc(x)$, and $\sec(x)$

24. If I want to place a 12-foot ladder against the top of an 8.5-foot wall, what should the angle of elevation of my ladder be?

a. 38°
b. 45°
c. 51°
d. 63°
e. 67°

25. Simplify: $\cos(2x) + \sin(2x) + 2\sin^2(x)$.

a. $\sin^2(x) + 2\cos(x)$
b. $\frac{1\cos^2(x)}{\sin(x)}$
c. $1 + 2sin(x)cos(x)$
d. $\sin(x)\cos(x)$
e. $\frac{\cos(x)\sin(x) - \cos^2(x)}{2}$

26. Which of the following is equivalent to $\sec(x)$?

a. $\frac{\cos(x)}{\sin(x)}$
b. $\frac{1}{\sin(x)}$
c. $\cos(x)\sin(x)$
d. $\frac{1}{\cos(x)}$
e. $1 - \sin^2(x)$

27. If $\sin(86) = x$, then what is $\sin(43)\sin(47)$ in terms of x?

a. x
b. $\frac{x}{2}$
c. $\frac{1}{x}$
d. $1 + x$
e. $2x$

28. An airplane is approaching the airport and the angle of elevation of the plane as viewed from the airport is 20°. Ignoring the curvature of the earth, if the airplane is currently 750 feet in the air, how far is the horizontal distance between it and the airport, rounded to the nearest foot?

a. 2061 ft
b. 2143 ft
c. 2006 ft
d. 2472 ft
e. 2290 ft

29. Which of the following identities are incorrectly paired?

a. $\sin(a) + \sin(b) = 2\sin\left(\frac{a+b}{2}\right)\cos\left(\frac{a-b}{2}\right)$
b. $\cos(a) + \cos(b) = 2\cos\left(\frac{a+b}{2}\right)\cos(\frac{a-b}{2})$
c. $\tan(a) + \tan(b) = \frac{\sin(a+b)}{\cos(a)\cos(b)}$
d. $\cos(a) - \cos(b) = -2\sin\left(\frac{a+b}{2}\right)\sin(\frac{a-b}{2})$
e. $\sin(a) - \sin(b) = 2\sin\left(\frac{a-b}{2}\right)\cos(\frac{a-b}{2})$

30. Given that $\tan^2(x) = \frac{2}{3}$, what is the exact value of $\cos(x)$?

a. $\frac{\sqrt{6}}{3}$
b. $\frac{\sqrt{3}}{5}$
c. $\frac{\sqrt{15}}{5}$
d. $\frac{\sqrt{5}}{4}$
e. $\frac{2\sqrt{3}}{3}$

31. In ΔABC, D is a point on $\overline{BC}$, $\angle ABD = 90°$, $\angle ACD = 24°$, $\angle ADB = 32°$, and $\overline{\overline{AC}} = 5$. Find the length of $\overline{AD}$, rounded to the nearest hundredth.

a. 2.90
b. 3.84
c. 4.65
d. 4.81
e. 5.03

32. Simplify: $(\tan(x) + \tan(y))(\frac{1}{2}\cos(x+y) + \frac{1}{2}\cos(x-y))$

a. $\cos(x+y) \cdot \tan(2x)$
b. $\frac{\cos^2(x-y)}{\sin(x+y)}$
c. $\cos(2x-y)$
d. $\sin(x+y)$
e. $\frac{1}{\tan(x-y)}$

33. If a 125-foot building casts a 60-foot shadow, how tall is the building next to it that casts a 72-foot shadow?

a. 100 ft
b. 130 ft
c. 145 ft
d. 150 ft
e. 175 ft

34. In ΔABC, $\angle A = 17°$, $\overline{AB} = 4.2$, and $\overline{AC} = 9.3$. Rounded to the nearest tenth, what is the area of this triangle?

a. 5.5
b. 5.6
c. 5.7
d. 5.8
e. 5.9

35. Let $\sin(30) = a, \sin(45) = b, \sin(60) = c, \cos(30) = x, \cos(45) = y,$ and $\cos(60) = z$. Using these equivalences, rewrite $\cos(15)$ in terms of a, b, c, x, y and z (some letters may be used more than once, while others might not be used at all).

a. $ax + by$
b. $abc - xyz$
c. $by - zc$
d. $ac - xz$
e. $xy + ab$

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MATHEMATICS SECTION EXAM 5: TRIGONOMETRY II, SECTIONS 9.8-9.12

1. In triangle ABC, angle A is $\frac{\pi}{7}$, angle B is $\frac{\pi}{5}$, and side length AB is 12. What are side lengths AC and BC respectively?

   a. 7.05 and 5.21
   b. 5.21 and 7.05
   c. 10.57 and 8.86
   d. 8.86 and 5.91
   e. 8.01 and 5.91

2. Solve for x: $\sin(2x + 3) = \frac{1}{2}$.

   a. $x = \frac{\pi}{12}$
   b. $x = \frac{\pi}{6} - \frac{3}{2}\pi$
   c. $x = \frac{\pi}{12} - \frac{3}{2}$
   d. $x = \frac{\pi}{12} - 3$
   e. $x = \frac{\pi - 9}{6}$

3. What is the domain of $f(x) = \arccos(\frac{x}{2} - \pi)$?

   a. $[0,2]$
   b. $[-1,1]$
   c. $[2\pi - 2, 2\pi + 2]$
   d. $[\pi - 2, \pi + 2]$
   e. $[0, 2\pi]$

4. Which function below coincides with a sine function passing through the origin, having a minimum of -1, having a maximum of 1, and having a period of $\frac{\pi}{2}$?

   a. $f(x) = \sin(2x)$
   b. $f(x) = \frac{1}{2}\sin(4x)$
   c. $f(x) = \cos(\frac{x}{2} - \frac{\pi}{4})$
   d. $f(x) = 2\cos(2x + \pi)$
   e. $f(x) = \cos(4x - \frac{\pi}{2})$

5. In triangle QRS, angle Q is $\frac{\pi}{3}$, side length QR is 4, and side length QS is 9. What is side length RS?

a. $\sqrt{52}$
b. $\sqrt{61}$
c. $\sqrt{97}$
d. $\sqrt{133}$
e. $\sqrt{142}$

6. In triangle JKL, angle K is 27°, length JK is 3, and length KL is 13. What is the measure of angle J?

a. 0.57 radians
b. 0.60 radians
c. 1.78 radians
d. 1.89 radians
e. 3.04 radians

7. Solve for values of x in the first two quadrants: $(\cos(x+\frac{\pi}{3})+\sin(x+\frac{\pi}{3}))^2=1$.

a. $x=\frac{\pi}{6}$
b. $x=\frac{\pi}{3}$
c. $x=\frac{\pi}{6}$ and $\frac{2\pi}{3}$
d. $x=\frac{\pi}{3}$ and $\frac{2\pi}{3}$
e. $x=\frac{\pi}{6}$ and $\frac{\pi}{3}$

8. What is the domain of $f(x)=\text{arccot}(x)$?

a. $[-1,1]$
b. $[-\pi,\pi]$
c. $(-\infty,\infty)$
d. $[0,\infty)$
e. $(-\infty,0]$

9. Which function below represents the same graph as $f(x)=2-\cos(2x-\frac{\pi}{3})$?

a. $g(x)=\sin\left(2x-\frac{5\pi}{6}\right)+2$
b. $g(x)=\sin\left(2x+\frac{\pi}{6}\right)+2$
c. $g(x)=\sin\left(2x-\frac{\pi}{6}\right)-2$
d. $g(x)=\cos\left(2x+\frac{\pi}{3}\right)+2$
e. $g(x)=\cos\left(2x-\frac{\pi}{6}\right)-2$

10. Solve for x: $\cos(9x) - \cos(3x) = 0$.

a. $x = \frac{\pi}{12}k$
b. $x = \frac{\pi}{6}k$
c. $x = \frac{\pi}{3}k$
d. $x = \frac{\pi}{6} + \frac{\pi}{12}k$
e. $x = \frac{\pi}{3} + \frac{\pi}{6}k$

11. What is the domain of the function $h(x) = \arctan\left(3x - \frac{\pi}{2}\right)$?

a. $(-\infty, \infty)$
b. $[\frac{\pi}{6}, \frac{5\pi}{6}]$
c. $[0, \frac{\pi}{2}]$
d. $(0, \pi)$
e. $(-\frac{\pi}{2}, \frac{\pi}{2})$

12. Convert $\frac{13\pi}{4}$ from radians to degrees.

a. $45°$
b. $405°$
c. $495°$
d. $585°$
e. $765°$

13. What is the amplitude of a sine function with a maximum of 3 and a minimum of -1?

a. 1
b. 2
c. 3
d. 4
e. 6

14. Angle ABC intercepts arc AC of circle B. Measure angle ABC is $\frac{8}{7}$ radians and the length of arc AC is 56. What is the radius of circle B?

a. 49
b. 64
c. 56
d. $\frac{343}{8}$
e. $\frac{512}{7}$

15. What is the domain of $f(x) = \arcsin(\cos(x))$?

a. $(-\infty, \infty)$
b. $[0, \infty)$
c. $[-\frac{\pi}{2}, \frac{\pi}{2}]$
d. $[0, \pi]$
e. $[-1,1]$

16. What is the period of the function $g(x) = -2\tan\left(x - \frac{\pi}{2}\right) + 3$?

a. -2
b. 3
c. $\frac{\pi}{2}$
d. π
e. 2π

17. A circle of radius 3 with center O has arc JK of length 5. What is the measure of angle JOK?

a. $\frac{5}{3}$
b. $\frac{3}{5}$
c. $\frac{3\pi}{5}$
d. $\frac{\pi}{15}$
e. 15π

18. In triangle ABC, angle A measures 70°, angle B measures 50°, and side AB measures 6. What is the radius of a circle circumscribed about triangle ABC?

a. 3
b. 6
c. 6.39
d. 7.83
e. 12

19. Convert 1065° from degrees to radians.

a. $\frac{35\pi}{6}$
b. $\frac{1}{12}$
c. $\frac{69\pi}{12}$
d. 3π
e. $\frac{1}{24}$

20. What is the range of $f(x) = \sin\left(\arcsin\left(\frac{x}{2}\right)\right)$?

a. [-2,2]
b. (-2,2)
c. [-1,1]
d. (-1,0)
e. (0,1)

21. Solve for x: $4\cos(x) + 5 = 4\sin^2(x)$.

a. $x = \frac{\pi}{6}$
b. $x = \frac{\pi}{3}$
c. $x = \frac{\pi}{2}$
d. $x = \frac{2\pi}{3}$
e. $x = \frac{5\pi}{6}$

22. In triangle JKL, angle J is 22°, side length JK is 4, and side length JL is 7. What is side length KL?

a. 6.25
b. 4.77
c. 4.63
d. 4.41
e. 3.62

23. Which of the following functions does NOT have a period of 2π?

a. $f(x) = 2\sin(x - \frac{\pi}{2})$
b. $f(x) = \sin(x) - 2$
c. $f(x) = \cos(x - \frac{\pi}{2})$
d. $f(x) = \cot\left(\frac{x}{2} + \pi\right) - 1$
e. $f(x) = \sec(\frac{x}{2} - \frac{\pi}{2})$

24. Convert $(15\pi)°$ to radians.

a. $\frac{\pi^2}{12}$
b. $\frac{\pi}{12}$
c. 12
d. $\frac{12}{\pi}$
e. $12\pi^2$

25. In triangle ABC, angle A measures 60°, angle B measures 105°, and side length AB is 2. What is side length AC?

a. $2 + \sqrt{3}$
b. $\sqrt{2} + \sqrt{6}$
c. $\sqrt{6} - \sqrt{2}$
d. $2 + \sqrt{6}$
e. $4 + 2\sqrt{3}$

26. Solve for x: $\sin(2x) + \sin(x) - \sqrt{3}\cos(x) = \frac{\sqrt{3}}{2}$.

a. $x = 0$
b. $x = 0, \frac{\pi}{2}$
c. $x = \frac{2\pi}{3}$
d. $x = \frac{\pi}{3}, \frac{2\pi}{3}$
e. $x = \frac{\pi}{6}, \frac{\pi}{3}$

27. In triangle PQR, angle Q measures 43°, side length PQ is 6, and side length QR is 11. What is the length of side PR?

a. 15.92
b. 10.58
c. 10.43
d. 9.59
e. 7.78

28. What is the period of $f(x) = 2\csc(x - \frac{\pi}{2}) = 1$?

a. 1
b. 2
c. $\frac{\pi}{2}$
d. π
e. 2π

29. Convert 4 radians to degrees.

a. 180°
b. 229°
c. 360°
d. 458°
e. 720°

30. In triangle ABC, measure angle A is 45°, measure angle B is 75°, and side length AB is 5. What is side length BC?

a. $\frac{15}{4}$
b. $\frac{5\sqrt{3}}{2}$
c. $\frac{5\sqrt{10}}{3}$
d. $\frac{5\sqrt{6}}{2}$
e. $\frac{5\sqrt{2}}{3}$

31. What are the period and amplitude respectively of the graph of $f(x) = \sin(x)\cos(x)$?

a. $\frac{\pi}{2}$ and $\frac{1}{2}$
b. π and $\frac{1}{2}$
c. π and 1
d. $\frac{\pi}{2}$ and 2
e. π and 2

32. In triangle JKL, measure angle J is 15°, side length JK is 4, and side length JL is 5. What is side length KL?

a. $\sqrt{41 - 10\sqrt{6} - 10\sqrt{2}}$
b. $\sqrt{41 - 10\sqrt{6}}$
c. $\sqrt{41 - 10\sqrt{6} + 10\sqrt{2}}$
d. $\sqrt{41 + 5\sqrt{6} - 5\sqrt{2}}$
e. $\sqrt{41 - 5\sqrt{2}}$

33. What is the range of the graph of $y = \arccos(x)$?

a. $[-1, 1]$
b. $[-\pi, \pi]$
c. $[0, 1]$
d. $[0, \pi]$
e. $[0, 2\pi]$

34. Solve for x: $7\sin^2(x) + 6\sin(x) = 2\cos^2(x) - 3$.

a. $x = \arcsin(-\frac{1}{3})$
b. $x = \arccos(-\frac{1}{3})$
c. $x = \arcsin(\frac{1}{3})$
d. $x = \operatorname{arccot}(\frac{1}{3})$
e. $x = \arctan(-\frac{1}{3})$

35. In triangle RST, the measure of angle R is $\frac{\pi}{6}$ radians, side length ST is $\sqrt{3}$, and side length RT is 3. What is the measure of angle T?

a. $\frac{\pi}{6}$
b. $\frac{\pi}{3}$
c. $\frac{\pi}{2}$
d. $\frac{2\pi}{3}$
e. $\frac{5\pi}{6}$