2024 Algebra II Exam

1. What value of x makes this inequality true?

$$-8x + 10 \geq 15$$

(a) $x \leq -\frac{5}{8}$ (b) $x \geq \frac{4}{9}$ (c) $x \leq -\frac{8}{5}$ (d) $x \leq \frac{4}{9}$ (e) $x = \frac{5}{8}$

2. Leroy has a game night at 5:36 pm. His friend's house is 460 meters away from his home. If it is 5:11, at what speed in meters per minute must he travel to attend his game night on time if he is at his home?

(a) 20 m/min (b) 25 m/min (c) 18 m/min (d) 18.5 m/min (e) 18.4 m/min

3. There are 3 normal 6-sided dice. If each die is rolled once, what is the probability that the sum of the dice equals 3?

(a) $\frac{1}{125}$ (b) $\frac{1}{108}$ (c) $\frac{1}{6}$ (d) $\frac{1}{36}$ (e) $\frac{1}{216}$

4. If $25^x = 125$ and $4^y = 32$ what is the value of $x + y$?

(a) $\frac{6}{4}$ (b) 4 (c) 3 (d) 6
(e) None of the Above

5. Which two binomials multiplied are equal to $14x^2 + 22x - 12$?

(a) $(2x + 6)(7x - 2)$ (b) $(7x - 6)(2x + 2)$
(c) $(7x + 3)(2x - 4)$ (d) $(2x + 4)(7x - 3)$
(e) None of the above

6. What is the simplified expression of

$$\sqrt{\frac{81x^8}{9x^6}}$$

(a) $3x$ (b) $9x^2$ (c) $3x^2$ (d) x^2 (e) $9x$

7. Which is equivalent to $36^{\frac{3}{2}}$?

(a) 300 (b) 462 (c) 216 (d) 356 (e) 145

8. How many different ways could you reorder 7 different textbooks on a bookshelf?

(a) 5040 (b) 49 (c) 343 (d) 7^7
(e) None of the above.

9. Find an equivalent of 4^2

(a) $4^{\frac{1}{2}}$ (b) 2^2 (c) $4^{\frac{1}{4}}$ (d) 2^4
(e) None of the above

10. Simplify the expression $\sqrt{50} + \sqrt{128}$

(a) $\sqrt{178}$ (b) $2\sqrt{5} + 8\sqrt{2}$ (c) 80 (d) $13\sqrt{2}$
(e) None of the above

11. What is $f(g(x))$ when $x = 3$?

$$f(x) = x^2 + 5x + 6$$
$$g(x) = x^2 + 9$$

(a) 334 (b) 429 (c) 420 (d) 519
(e) None of the above

12. If $4y - x = 10$, what is $\frac{16^y}{2^x}$?

(a) 10^2 (b) 2^{10} (c) 3^{10} (d) 4^{10}
(e) None of the above

13. Evaluate:

$$\sin\left(\frac{\pi}{2}\right)$$

(a) 1 (b) π (c) 0 (d) $\frac{1}{2}$ (e) $\frac{1}{4}$

14. If $f(x) = 3x + 2$, and $g(x) = 4x^2 + 3x + 2$, then what is $f(g(4))$?

(a) 242 (b) 240 (c) 236 (d) 250 (e) 256

15. Say $f(x) = \sqrt[4]{x^3}$ and $g(x) = \sqrt[4]{x^5}$, then what is $f(x) \times g(x)$?

(a) $\sqrt[8]{x^4}$ (b) x^2 (c) $\frac{x^8}{4}$ (d) x^4 (e) $\frac{x^4}{8}$

16. What are the solutions of $2x^2 - 5x - 3 = 0$?

(a) $x = -1$ and $x = \frac{3}{2}$ (b) $x = -3$ and $x = \frac{1}{2}$
(c) $x = 1$ and $x = -\frac{3}{2}$ (d) $x = 3$ and $x = -\frac{1}{2}$
(e) None of the above

17. Solve

$$3^{2x-1} = 27$$

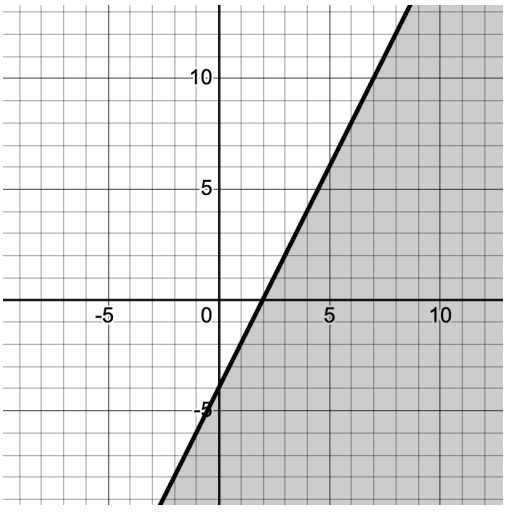
(a) $x = 0$ (b) $x = 1$ (c) $x = \frac{1}{2}$ (d) $x = -1$
(e) None of the above

18. Factor the expression:

$$x^2 - 9$$

(a) $(x + 3)(x + 3)$ (b) $(x - 3)(x + 3)$ (c) $(x - 3)(x - 3)$ (d) $(x)(x - 9)$
(e) None of the above

19. Select the inequality that represents the graph below:

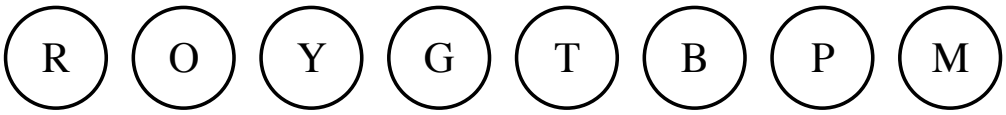


(a) $y > 4x - 2$ (b) $y \leq 2x - 4$ (c) $y < 2x - 4$ (d) $y \geq 2x - 4$ (e) $y \geq 4x - 2$

20. What is the product of $(2i + 3)$ and $(9 - 5i)$?

(a) $18i - 15$ (b) $3i + 27$ (c) $18i + 27$ (d) $-10i + 37$
(e) None of the above

21. You have 8 different balls, each a different color. The different colors of the balls are red, orange, yellow, green, teal, blue, purple, magenta. How many different ways are there to have the red ball in the front and the teal ball at the end if the balls are arranged in a line?



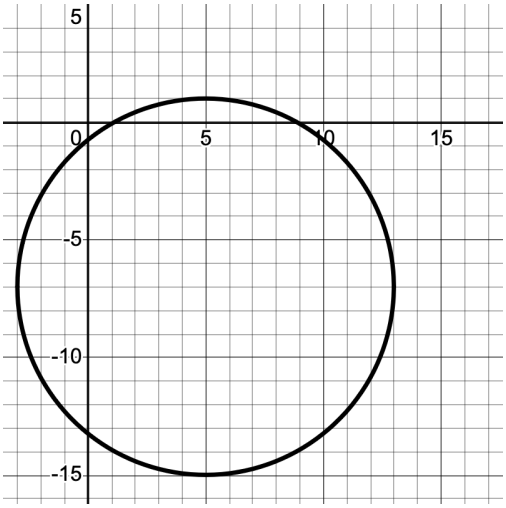
(a) 64 (b) 8^6 (c) 512 (d) 720
(e) None of the above

22. Solve for a, b, and c in the following system of equations.

$$\begin{aligned} 2a + 3c &= 13 \\ a - 5b + 4c &= 4 \\ -7a + 5b + 4c &= 8 \end{aligned}$$

(a) $a = 2, b = 2, c = 3$ (b) $a = 2, b = 1, c = 3$
(c) $a = 1, b = 3, c = 3$ (d) $a = 3, b = 2, c = 2$
(e) None of the above

23. Find the equation that represents this graph.



(a) $x^2 + 7x + y^2 + 8y = 0$ (b) $x^2 - 10x + y^2 + 14y + 10 = 0$
(c) $x^2 - 5x + y^2 + 7y + 64 = 0$ (d) $x^2 + 5x + y^2 - 7y = 8$
(e) None of the above

24. What is $\sqrt{81} \times 3$

(a) 100 (b) 27 (c) 12 (d) $\sqrt{243}$
(e) None of the above

25. What are the vertical asymptotes of the function:

$$y = \frac{x^2 - 36}{x^2 - 8x + 15}$$

(a) $x = 3$ and $x = 5$ (b) $x = -3$ and $x = -5$
(c) $x = 3$ and $x = 6$ (d) $x = 3$ and $x = -5$
(e) None of the above

26. Two cars are traveling north along a highway. The first drives at 40 mph, and the second, which leaves 3 hours later, travels at 60 mph. How long after the second car leaves will it take for the second car to catch the first?

(a) 1 hour 12 minutes (b) 2 hours (c) 5 hours (d) 6 hours
(e) 6 hours 40 minutes

27. Find the solutions to:

$$3x^2 + 12(x + 1) = -3$$

(a) $x = -2 + i$ and $x = -2 - i$ (b) $x = 4 + i$ and $x = -2 - i$
(c) $x = i + 2$ and $x = 8 + i$ (d) $x = 2 + i$ and $x = 2 - i$
(e) None of the above

28. How many point(s) does the function intersect the x-axis on a graph?

$$y = (x^2 + 4x + 4)(x + 6)(x^2 - 9)$$

(a) 2 (b) 3 (c) 4 (d) 5
(e) None of the above

29. A man in a canoe travels upstream against the current, traveling 400 meters in 2 hours. Later on he travels downstream with the current, traveling 600 meters in 2 hours. What is the speed of the current, c, and what is the speed of the boat in still water, b?

(a) c = 50 m/hr, b = 100 m/hr (b) c = 50 m/hr, b = 250 m/hr
(c) c = 100 m/hr, b = 200 m/hr (d) c = 150 m/hr, b = 300 m/hr
(e) None of the above

30. Solve for x.

$$x(x - 2) = x^2 - 8$$

(a) $x = -2$ (b) $x = -1$ (c) $x = 2$ (d) $x = 4$
(e) None of the above

31. Given the function below, find the value of f(2).

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

(a) $f(2)$ is undefined (b) $f(2) = 4$ (c) $f(2) = 2$ (d) $f(2) = -4$
(e) None of the above

32. If $x + y = 7$ and $xy = 12$, find the value of $x^2 + y^2$

(a) $x^2 + y^2 = 49$ (b) $x^2 + y^2 = 81$ (c) $x^2 + y^2 = 36$ (d) $x^2 + y^2 = 25$
(e) None of the above

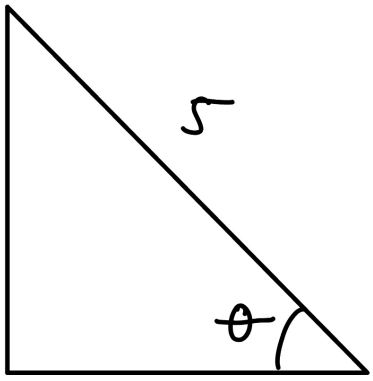
33. If $f(x) = x^2 + 7x - 2$, and $g(x) = 9 - 2x$, what's $f(g(x))$ when $x = 2$?

(a) 82 (b) 58 (c) 52 (d) 49 (e) 67

34. Find the center of a circle given by $(x + 13)^2 + (y - 2)^2 = r^2$ in the standard coordinate plane.

(a) $(26, 6)$ (b) $(13, 2)$ (c) $(-13, -2)$ (d) $(13, -2)$ (e) $(-13, 2)$

35. Given one angle of a right triangle $\theta = \frac{\pi}{4}$ and the hypotenuse is length 5, what are the measures of the other two sides?



(a) $\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}$ (b) $\frac{\sqrt{3}}{2}, \frac{1}{2}$ (c) $\frac{5\sqrt{3}}{2}, \frac{5}{2}$ (d) $4, 3$ (e) $\frac{5\sqrt{2}}{2}, \frac{5\sqrt{2}}{2}$

36. What is the y-value of the vertex of this function?

$$f(x) = 2x^2 - 3x + 1$$

(a) 3 (b) 1 (c) $\frac{1}{2}$ (d) $-\frac{1}{8}$
(e) None of the above

37. Solve for x, when $x > 1$:

$$2x^2 - 5x + 3 = 0$$

(a) $x = 2$ (b) $x = 1$ (c) $x = 3$ (d) $x = 1.5$
(e) None of the above

38. What is the sum of the reciprocals of the roots of the equation:

$$3x^2 - 7x + 4 = 0$$

(a) $\frac{4}{3}$ (b) $\frac{7}{4}$ (c) $\frac{7}{3}$ (d) $\frac{1}{4}$
(e) None of the above

39. Line AB passes through points $(-5, 8)$ and $(-3, 0)$. What is the slope-intercept equation for line CD if the line CD passes through point $(0, -1)$ and is perpendicular to line AB?

(a) $y = -4x - 12$ (b) $y = 4x - 12$ (c) $y = -\frac{1}{4}x - 1$ (d) $y = \frac{1}{4}x - 1$
(e) None of the above

40. Find the slope-intercept equation of the line though the point $(1, 3)$ and the vertex of the parabola $y = x^2 + 8x + 9$.

(a) $y = 2x + 1$ (b) $y = \frac{4}{3}x + \frac{5}{3}$ (c) $y = -x + 4$ (d) $y = -\frac{4}{3}x + \frac{13}{3}$
(e) None of the above.