1. What is the equation in standard form of the line through the points (1, 3) and (5, 7)?
   (A) \( x - y = 2 \)  (B) \( x^2 - 6x + y = 2 \)
   (C) \( x - y = -2 \)  (D) \( x + y = 4 \)  (E) NOTA

2. For what value of \( x \) does \( 3(3x - 3) - (3x - 1) = 8 + 3(3 - 3x) \)?
   (A) \( \frac{5}{9} \)  (B) \( \frac{5}{3} \)  (C) \( \frac{5}{2} \)  (D) \( \frac{7}{2} \)  (E) NOTA

3. What are the roots of the equation \( x^2 - x - 12 = 0 \)?
   (A) 3, 4  (B) 3, -4  (C) 4, 3  (D) 4, -3  (E) NOTA

4. The profit at a company is given by the formula \( p(x) = -100x^2 + 700x + 15000 \). Find the value of \( x \) at which profit is maximized.
   (A) \( \frac{7}{15} \)  (B) \( \frac{3}{2} \)  (C) \( \frac{5}{2} \)  (D) \( \frac{7}{2} \)  (E) NOTA

5. Solve for \( x \): \( \ln x + \ln (2x) = 2 \)
   (A) \( \frac{e^2 \sqrt{2}}{8} \)  (B) \( \frac{e \sqrt{2}}{2} \)  (C) 2  (D) \( \frac{e^2}{2} \)  (E) NOTA

6. Solve for \( a + b + c + d + e \): \( a + b = 10 \), \( b + c = -7 \), \( c + d = 3 \), \( d + e = 11 \), \( e + a = 1 \)
   (A) 3  (B) 6  (C) 9  (D) 12  (E) NOTA

7. Given that \( 3^x = 8 \), evaluate \( 9^x - 5 \cdot 3^{2x} + 4 \).
   (A) -260  (B) -256  (C) -252  (D) -320  (E) NOTA

8. Solve for \( x \): \( \sqrt{x^2 - 4x - 38} = \sqrt{7} \)
   (A) -5  (B) 9  (C) -5 or 9  (D) 25  (E) NOTA

9. Solve for \( q \): \( \sqrt{5 - \sqrt{7 + q}} = 1 \)
   (A) 4  (B) 9  (C) 16  (D) 25  (E) NOTA
10. Given the set $A = \{-10, -9, -8, \ldots, 8, 9, 10\}$, how many elements $x$, of $A$, satisfy $x^2 - 5x - 11 \leq 0$?

(A) 8  (B) 9  (C) 10  (D) 11  (E) NOTA

11. Arthur buys a piece of land. Bart buys the same land from Arthur for at least two hundred percent more than what Arthur paid for it. Carl buys the same land from Bart for at least four hundred percent more than what Bart paid for it. Dan buys the same land from Carl for at least forty percent more than what Carl paid for it. If Dan paid 4.2 million dollars for the land, what is the largest amount that Arthur could have paid for the land?

(A) $200,000  (B) $250,000  (C) $375,000  (D) $1,312,500  (E) NOTA

12. For what values of $x$ is $x^2 + 5x + 9 > 5$?

(A) $x > -4$  (B) $x < -1$ or $x > 4$
(C) $x < -1$ and $x > -4$  (D) $x > -1$ or $x < -4$  (E) NOTA

13. How many of the following are roots of $x^3 + 6 = -2$?
   I: 2
   II: -2
   III: $1 + i\sqrt{3}$
   IV: $1 - i\sqrt{3}$

(A) 1  (B) 2  (C) 3  (D) 4  (E) NOTA

14. What is the domain of the function $f(x) = \frac{\sqrt{4-x}}{x-3}$, assuming both the domain and range are subsets of the real numbers?

(A) $x < 4$  (B) $x \neq 3$  (C) $x \geq 4$  (D) $x \leq 4$ and $x \neq 3$  (E) NOTA

15. How many integer values of $x$ satisfy $\frac{x-3}{2x+1} > 4$?

(A) 0  (B) 1  (C) 3  (D) infinitely many  (E) NOTA

16. Given that $f(x) = \frac{6}{6 - 3x}$, determine $f^{-1}(x)$.

(A) $\frac{2x - 2}{x}$  (B) $\frac{6 - 3x}{6}$  (C) $\frac{-6}{6 - 3x}$  (D) $\frac{2 - 3x}{2}$  (E) NOTA
17. Given \( g(d) = 9d + 4 \) and \( f(d) = \frac{d^2}{9} \), evaluate \( g(f(14)) \).

(A)  188  (B)  192  (C)  196  (D)  200  (E) NOTA

18. Solve for \( f \):

\[ 2^{-3} 32^{f+1} = 8^{3f-3} \]

(A) \( \frac{-10}{3} \)  (B) \( \frac{7}{3} \)  (C) \( \frac{10}{3} \)  (D) \( \frac{13}{3} \)  (E) NOTA

19. Solve for \( y \) given that \( x \) and \( y \) are both integers:

\[ 6^{x-2} 18^{y+2} = 3,779,136 \]

(A) -2  (B) 1  (C) 2  (D) 2 or -2  (E) NOTA

20. What is the sum of the non-real roots of \( x^3 - 2x^2 + 4x - 8 = 0 \)?

(A) 0  (B) 1  (C) 2  (D) 3  (E) NOTA

21. What is the sum of the reciprocals of the roots of \( f(x) = 4x^5 + 2x^4 - 5x^3 + 4x + 3 \)?

(A) \(-2\)  (B) \(\frac{-3}{2}\)  (C) \(\frac{-4}{3}\)  (D) -1  (E) NOTA

22. Given that \( f(x - 3) = x^2 + 6x - 11 \), what is the constant term of \( \frac{f(x)}{5} \)?

(A) \(\frac{-11}{5}\)  (B) \(\frac{16}{5}\)  (C) \(\frac{41}{5}\)  (D) \(\frac{66}{7}\)  (E) NOTA

23. Given that \( \frac{4x}{x^2 - 4x - 5} = \frac{A}{x+1} + \frac{B}{x-5} \) Find \( A + B \), where \( A \) and \( B \) are real numbers.

(A) \(\frac{5}{6}\)  (B) 1  (C) 4  (D) 6  (E) NOTA

24. Given that \( \frac{32x - 9}{x^2 + 2x + 1} = \frac{A}{x + 1} + \frac{B}{(x + 1)^2} \) Find \( A + B \), where \( A \) and \( B \) are real numbers.

(A)-11  (B) -10  (C) -9  (D) -8  (E) NOTA
25. Given that $x + y + z = 1$ and $3x - 2y + 3z = 5$, solve for $x$ in terms of $z$.

(A) $-z + \frac{7}{5}$  (B) $-z - \frac{7}{5}$  (C) $z + \frac{7}{5}$  (D) $-z - \frac{7}{5}$  (E) NOTA

26. Given that $-3x + 4y + 2z = -15$, $-3x + 4y + 4z = -13$, and $-4x + y + 4z = -10$, evaluate $x + y + z$.

(A) 0  (B) 1  (C) 2  (D) 3  (E) NOTA

27. Solve the equation for $x$: $\log_2 (5x) + \log_8 (8x^3) = 1$

(A) $\frac{\sqrt{2}}{5}$  (B) $\frac{\sqrt{5}}{5}$  (C) $\frac{\sqrt{10}}{10}$  (D) $\frac{\sqrt{10}}{20}$  (E) NOTA

28. Solve the equation for $x$: $\log_3 (x) = \log_9 (27)$

(A) $3\sqrt{3}$  (B) $3^{\sqrt{3}}$  (C) $3^{\frac{1}{3}}$  (D) 9  (E) NOTA

29. Assuming that $N$ is a natural number less than or equal to 1000, what is the lowest possible value of the expression $[\log_2 N] - \log_2 N$? Note: $[x]$ stands for the greatest integer less than or equal to $x$.

(A) $\log_2 1000 - 9$  (B) $\log_2 511 - 7$  (C) $8 - \log_2 511$  (D) $9 - \log_2 1000$  (E) NOTA

30. Solve for $x$: $\frac{x - 2}{-4x + 5} \leq -3$

A) $\left[ -\frac{13}{11}, \infty \right)$  B) $\left[ \frac{13}{11}, \infty \right)$  C) $\left( \frac{13}{11}, \frac{5}{4} \right]$  D) $\left(\frac{13}{11}, \frac{5}{4}\right]$  E) NOTA

31. Bill is nine years older than Mary, and in five years he will be twice Mary’s age three years ago. How old is Bill now?

(A) 11  (B) 17  (C) 20  (D) 29  (E) NOTA
32. If \( r = -3 \) is a solution to \( 3r - qr^3 + 11 = 5 \), what is the value of \( q \)?

(A) \( \frac{5}{9} \)  
(B) \( -\frac{5}{9} \)  
(C) \( \frac{1}{9} \)  
(D) \( -\frac{1}{9} \)  
(E) NOTA

33. One of the roots of \( 3x^2 + 18x + c = 0 \) is twice the other. What is the value of \( c \)?

(A) 6  
(B) 12  
(C) 18  
(D) 24  
(E) NOTA

34. In the Mu Alpha Theta Survivor Contest, five contestants named A, B, C, D, and E are placed in a room. They cast one vote each. A and B receive a total of 2 votes. D and E receive a total of 3 votes. A and D receive a total of 2 votes. A and E receive a total of 3 votes. Who received the most votes?

(A) E  
(B) D  
(C) C  
(D) B  
(E) NOTA

35. Given that \( k(m) = 7m - 3 \), what is \( k^{-1}(m) \)?

(A) \( \frac{m-3}{7} \)  
(B) \( \frac{m+3}{7} \)  
(C) \( \frac{7m-7}{3} \)  
(D) \( \frac{7m-3}{7} \)  
(E) NOTA

36. What is the minimal set of quadrants which contains the entire set of points satisfying \( -4y - 3x < 3 \) and \( x + y < -5 \)?

(A) I  
(B) II  
(C) I, II  
(D) I, II, IV  
(E) NOTA

37. The equation \( \frac{x^2}{a^2} - \frac{y^2}{b^2} = 1 \) is the general form for what shape centered at the origin and aligned with the coordinate axes?

(A) circle  
(B) ellipse  
(C) parabola  
(D) hyperbola  
(E) NOTA

38. Given that \( g(d) = 2d - 7 \) and \( f(d) = \frac{d}{d^2 - 2} \), evaluate \( g(f(7)) \)?

(A) \( -\frac{49}{5} \)  
(B) \( -\frac{21}{5} \)  
(C) \( \frac{21}{5} \)  
(D) \( \frac{49}{5} \)  
(E) NOTA

39. How many natural numbers are solutions of \( 3w - 44 < 35 \)?

(A) 0  
(B) 23  
(C) 25  
(D) 26  
(E) NOTA
40. How many integers satisfy: \( t - 1 < -t + 4 < 2t + 17 \)

(A) 1  (B) 3  (C) 5  (D) 7  (E) NOTA