1992 Mu Alpha Theta National Convention

EQUATIONS/INEQUALTIES TOPIC TEST

1. IF $x - 17 = 15 - x$ then $x =$

a. 16 b. 1 c. -1 d. -16 e. NOTA

2. If $16^x = 32$, then $x =$

a. 2 b. 3/2 c. 5/4 d. 4/5 e. NOTA

3. What is the greatest integer x for which $-6x - 1 > 12$ is true?

a. 3 b. 2 c. -2 d. -3 e. NOTA

4. This absolute inequality $| 3 - 4x | < 5$ contains how many integral solutions?

a. 0 b. 1 c. 2 d. infinite e. NOTA

5. Given this system of equations

$$\begin{aligned} x + 2y + 3z &= -4 \\ 3x - 4y + z &= 0 \\ -2x + y - z &= 3 \end{aligned}$$

Find the sum of x , y and z.

a. 0 b. -4 c. -5 d. -6 e. NOTA

6. If $3(1) + 3(2) + 3(3) + \ldots + 3N = 165$, find N

a. 55 b. 11 c. 9 d. 7 e. NOTA

7. Find the smallest real value of x such that
$x * 5 + 5 * x = 37$ if $a * b = a^2 - 4b$ is true

a. -4 b. 0 c. 4 d. 8 e. NOTA

8. Given $3x + 2y = 17$, $x > 0$ and $y > 0$, how many integral pairs (x,y) are possible for this equation.

a. 1 b. 3 c. 5 d. 7 e. NOTA

9. Find the smallest integer that satisfies

$$2.7(x - 2) + 0.1 < 4.2x - 2.3$$

a. 2 b. 1 c. -1 d. -2 e. NOTA

10. The number of digits in the number $D = 4^{12} \cdot 25^8$ is

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

11. The sum of $1/a + 1/b + 1/c$ is an integer where a, b, and c are unique positive integers. Find the sum of $a + b + c$.

a. 20 b. 17 c. 14 d. 11 e. NOTA

12. Find the product of the roots of $3x^2 - 7x - 6 = 0$.

a. -7/3 b. -2 c. 2 d/ 7/3 e. NOTA

13. Solve for k over real numbers.

$$2\{ 3k - [15 - 3(2k + 2)]\} = 8(4k - 3) - (5k - 3))$$

a. -10/3 b. -3 c. -1/3 d. 1/3 e. NOTA

14. $5 + \cfrac{2}{3 - \cfrac{5}{2 - \cfrac{3}{5-2/3}}} = a/b$ where a and b are relatively prime. Find a + b.

a. 138 b. 67 c. 25 d. 11 e. NOTA

15. If the graphs of $2y + x + 3 = 0$ and $3y + ax + 2 = 0$ are two lines that meet at right angles, the value of a is

a. -6 b. -2/3 c. 2/3 d. 6 e. NOTA

16. Solve for x: $\left(\dfrac{(2/3)(5/8) + (7/18)}{4 \quad 5/6}\right) \left(8 \quad 2/5\right) + 5/7 - x = 4/35$

a. 7/2 b. 3 c. 5/2 d. 2 e. NOTA

17. Which of the following roots does not satisfy the equation

$$x^3 + 5x^2 - 2x - 24 = 0$$

a. -4 b. -3 c. -2 d. 2 e. NOTA

18. If $x + y = 18$ and $x^2 - y^2 = 72$, find $x - y$

a. 3 b. 5 c. 7 d. 11 e. NOTA

19. If one of the solutions of the equation $x^2 + x + c = 0$ is 2. What is the other root?

a. 3 b. 1 c. -2 d. -3 e. NOTA

20. Find the largest value of x where x is real which makes the statement true?

$$1 - \cfrac{3}{2 - \cfrac{1}{1 - \cfrac{1}{x}}} = 3 - 2(x+1)$$

a. 6 b. 3 c. 2 d. 1/2 e. NOTA

21. When three integers are added two at a time, three distinct sums are formed: 56, 79 and 61. What is the sum of all three of the original numbers.

a. 98 b. 113 c. 126 d. 141 e. NOTA

22. The larger root of the equation.

$(x - 3/8)(x - 3/8) + (x - 3/8)(x - 1/2) = 0$ is

a. 3/8 b. 7/16 c. 1/2 d. 7/8 e. NOTA

23. $3 - \dfrac{1}{3^{-1} + x^{-1}} = 1/3$ Solve for x.

a. 6 b. 12 c. 24 d. 36 e. NOTA

24. Find the sum of the roots of $|x - 7| = 3x + 1$

a. -4 b. -5/2 c. -2 d. -3/2 e. NOTA

25. $\frac{A}{x-2} + \frac{B}{x-3} = \frac{18x-44}{x^2-5x+6}$ Find $|A - B|$

a. 2 b. 7 c. 13 d. 18 e. NOTA

26. If the points (1,3), (2,7), and (3,15) belong to the equation $y = ax^2 + bx + c$, find abc.

a. -30 b. -24 c. -16 d. -12 e. NOTA

27. If $|x|^2 + |x| - 6 = 0$ then

a. There is only one root.
b. The sum of the roots is 1.
c. The sum of the roots is 0.
d. The product of the roots. is -6.
e. NOTA

28. Given the following system of linear equations

$(x + 2)(y - 4) = xy$
$(x + 8)(y - 10) = xy$ Find the value of $y - x$.

a. 20 b. 16 c. 12 d. 8 e. NOTA

29. How many integral values of x satisfy

$$\frac{4}{x} \geq \frac{x}{x+3} \; ?$$

a. 10 b. 9 c. 8 d. 7 e. NOTA

30. Given $12^{3x+1} = 9^x \cdot 2^{y+1}$, find y

a. -5 b. -1 c. 3 d. 7 e. NOTA