Select the correct letter. Choice (E) represents "none of these answers."

1. $\frac{2}{3} + \frac{3}{4} + \frac{5}{6} + x = 3$ Solve for x.

(A) $\frac{4}{3}$ (B) $\frac{1}{2}$ (C) $\frac{2}{3}$ (D) $\frac{3}{4}$ (E) nota

2. Solve for x: $y = \frac{2x+3}{5+3x}$

(A) $-\frac{3}{2}$ (B) $\frac{5y-3}{2-3y}$ (C) $\frac{2y+3}{5+3y}$ (D) $\frac{5y-3}{3y-2}$ (E) nota

3. If $f(x) = \frac{1}{2x-3}$, then $f^{-1}(x) = ?$

(A) 2 (B) $\frac{6x+1}{2x}$ (C) $\frac{3x+1}{2x}$ (D) $\frac{x+3}{6x}$ (E) nota

4. Give the solution for x in interval notation: $\frac{6}{x-5} < x$

(A) $(-1, 6)$ (B) $(-1,5) \cup (6,\infty)$ (C) $(-1,6) \cup (6,\infty)$ (D) $(-1,5) \cup (5,\infty)$ (E) nota

5. A 60% salt solution and an 80% salt solution are combined to form 35 ml of a 72% salt solution. How many milliliters of the 60% solution are needed for the mixture?

(A) 11.9 ml (B) 21 ml (C) 14 ml (D) 23.1 ml (E) nota

6. Consider the equation $2(x+2)^{2/3} = 162$. Solve over the set of real numbers. What is the sum of the solutions?

(A) −4 (B) 727 (C) 1458 (D) 0 (E) nota

7. If $a^{10} = x^2$, $a > 0$, and $x > 0$, then $\log_a x = ?$

(A) $\sqrt{10}$ (B) 100 (C) 20 (D) 5 (E) nota

8. If $f(x) = \frac{1}{2}x + 1$ and $g(x) = -\frac{2}{3}x - 4$, then the slope of $f(g(x))$ is ?.

(A) $-\frac{1}{3}$ (B) $-\frac{1}{6}$ (C) $\frac{7}{6}$ (D) −3 (E) nota

9. What is the coefficient of the fifth term in the expansion of $(3x - 2)^7$?

(A) 945 (B) 35 (C) 15,120 (D) 2520 (E) nota

10. Determine the sum of A, B, and C so that the graph of $Ax + By = C$ will contain the points $(-2, 3)$ and $(1, 4)$. (note: A, B, & C are relatively prime integers and $A > 0$)

(A) -13 (B) -7 (C) 15 (D) -15 (E) nota

11. Given: $f(x) = x^2 - 8x + k$

Suppose the minimum value of the given function is -12. What is the value of k ?

(A) 4 (B) -60 (C) -4 (D) -12 (E) nota

12. $(3 - i)^3 = ?$ note: $i = \sqrt{-1}$

(A) $30 + 10i$ (B) $8 - 6i$ (C) $9 - 3i$ (D) $18 - 26i$ (E) nota

13. For what value of k will the graph of $6x + ky = 12$ be perpendicular to the graph of $3x - 5y = 10$?

(A) 10 (B) -10 (C) $\frac{18}{5}$ (D) $-\frac{5}{18}$ (E) nota

14. Consider the following equation: $y^2 + 8x - 6y + 25 = 0$

What is the x-coordiante of the vertex of the parabola?

(A) 3 (B) -2 (C) 2 (D) -3 (E) nota

15. Laura invested some money in Stock **A** and Stock **B**. Last year she received a dividend of \$120 from Stock **A** and received an 8% return on her investment in Stock **B**. Her total earnings from the two stocks was \$580. How much money did Laura invest in Stock **B**?

(A) \$5750 (B) \$575 (C) \$7130 (D) \$7250 (E) nota

16. Find the sum of the values of **k** that make -3 a root of $P(x) = x^4 - kx^3 + k^2x - 6$.

(A) -3 (B) 9 (C) -9 (D) 3 (E) nota

17. Suppose y varies jointly as x and z and inversely as u. If $y = 6$ when $x = 2$, $z = 3$, and $u = 4$, then find y when $x = 4$, $z = 3$, and $u = 8$.

(A) 6 (B) $\frac{3}{8}$ (C) 24 (D) 4 (E) nota

18. $\sum_{k=1}^{\infty} 2(\frac{1}{3})^{k-1} = ?$

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

19. $\sqrt{42 - \sqrt{42 - \sqrt{42 - \ldots}}} = N$. Find the value of N.

(A) 5 (B) 6 (C) 7 (D) $\sqrt{42}$ (E) nota

20. Simplify: $\dfrac{\dfrac{p^2-4}{p^2-5p+6}}{\dfrac{p^2+4p+4}{p^2-4p+3}}$ (note: $p \notin \{-2, 1, 2, 3\}$)

(A) $\dfrac{p+2}{p-1}$ (B) $\dfrac{p-1}{p+2}$ (C) $\dfrac{p+2}{p-3}$ (D) $\dfrac{p-3}{p+2}$ (E) nota

21. Find x such that $\left(\dfrac{2x+1}{x}\right)^2 - \dfrac{2x+1}{x} = 2$.

(A) $\varnothing$ (B) -1 (C) $-\dfrac{1}{4}$ (D) $-\dfrac{1}{3}$ (E) nota

22. Suppose Cramer's Rule was used to solve a system and the y-coordinate is represented as $\dfrac{\begin{vmatrix} 1 & -3 \\ 2 & 3 \end{vmatrix}}{\begin{vmatrix} 1 & -1 \\ 2 & 3 \end{vmatrix}}$. Which system was used in this problem?

(A) $x - 3y = -1$, $2x + 3y = 3$ (B) $x - y = 1$, $2x + 3y = 3$ (C) $x - y = -3$, $2x + 3y = 3$ (D) $x + 2y = -3$, $-x + 3y = 3$ (E) nota

23. Find x in the following equation: $6^x = 84$ What digit is in the hundredth's place of x ?

(A) 5 (B) 6 (C) 7 (D) 8 (E) nota

24. How many positive integral factors exist for the number 333,234 ?

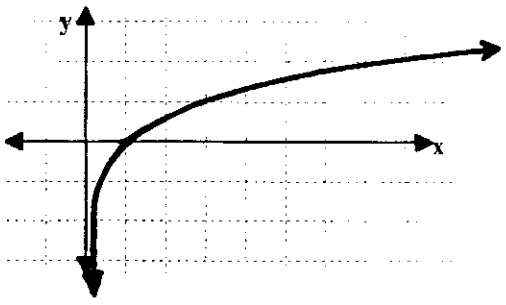
(A) 20 (B) 30 (C) 40 (D) 60 (E) nota

25. A committee of 6 people must be formed from a group which contains 5 women and 4 men. The probability that the committee will contain 3 women and 3 men is $\dfrac{A}{B}$ (where the gcf of A and B is one). Find A + B.

(A) 7 (B) 31 (C) 43 (D) 721 (E) nota

26. Which equation best describes the graph shown?

(A) $y = 10^x$
(B) $y = e^x$
(C) $y = \log(x)$
(D) $y = \ln(x)$
(E) nota



27. Suppose $A = \begin{bmatrix} -3 & 3 & 1 \\ 2 & 0 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 0 \\ 1 & -3 \\ -1 & 4 \end{bmatrix}$. Find the element in row 2, column 2 of $(AB)^{-1}$.

(A) $\dfrac{1}{16}$ (B) 16 (C) 15 (D) $\dfrac{1}{15}$ (E) nota

28. What is the remainder when $2x^3 - 3x^2 - 16x + 50$ is divided by $(-3 + 2x)$?

(A) 0 (B) 26 (C) 50 (D) 74 (E) nota

29. Simplify: $\frac{x^{1/2} - x^{-1/2}}{3^{-1}x^{-1/2}}$ (note: $\mathbf{x > 0}$)

(A) $\frac{x-1}{3}$ (B) $3\sqrt{x}$ (C) $\frac{\sqrt{x}}{-3}$ (D) $3x - 3$ (E) nota

30. In how many different ways can seven students be seated in a row with seven desks if two of them must be seated next to each other?

(A) 720 (B) 1440 (C) 2520 (D) 5040 (E) nota