For all questions, "NOTA" means none of the above answers are correct.

1. Solve for x if $3(x+1)-(x-3)=2(x-3)-2(x-1)$.

    A. -7 B. -5 C. -4 D. -2 E. NOTA

2. Find the sum of the roots of $f(x)$ if $f(x)=ax^3-bx^2+cx-d$ and all 3 roots are distinct.

    A. $-d/a$ B. d/a C. $-b/a$ D. b/a E. NOTA

3. Solve for x: $5=1+\dfrac{\sqrt{x}}{1+\dfrac{\sqrt{x}}{1+...}}$

    A. 20   B. 30   C. 400   D. 900   E. NOTA

4. Find $f^{-1}(10)$ if $f(x)=\dfrac{1+x}{1-x}$.

    A. $-\dfrac{11}{9}$ B. $-\dfrac{9}{11}$ C. $\dfrac{9}{11}$ D. $\dfrac{11}{9}$ E. NOTA

5. Find the solution set of the inequality: $|2x+5|+|4x+7|<30$

    A. $-16<x<14$ B. $-7<x<3$ E. NOTA

    C. $-16<x<14$ and $-7<x<3$ D. $-7<x<14$

6. Find $a^2+b^2+c^2$ if a, b, and c are the roots of $f(x)=2x^3+3x^2+4x+5$

    A. $-\dfrac{7}{4}$ B. $\dfrac{1}{4}$ C. $\dfrac{17}{4}$ D. $\dfrac{25}{4}$ E. NOTA

7. An ellipse has a minor axis of length 6, a major axis of length 8, and center at $(3,-2)$. The minor axis is parallel to the x-axis. Which of these equations describes the ellipse?

    A. $\dfrac{(x-3)^2}{16}+\dfrac{(y+2)^2}{9}=1$ B. $\dfrac{(x-3)^2}{9}+\dfrac{(y+2)^2}{16}=1$ E. NOTA

    C. $\dfrac{(x-3)^2}{64}+\dfrac{(y+2)^2}{36}=1$ D. $\dfrac{(x-3)^2}{36}+\dfrac{(y+2)^2}{64}=1$

8. Find the area of the ellipse: $9x^2 + 4y^2 + 36x - 24y + 36 = 0$

    A. 6π B. 9π C. 12π D. 36π E. NOTA

9. Bart has 80 coins worth five dollars, and each coin is either a nickel or a dime. If he has n nickels and d dimes, find $n - d$.

    A. -40 B. -20 C. 20   D. 40   E. NOTA

10. If $f(x+1) = x + f(x)$ and $f(0) = 1$, then find $f(6)$

    A. 10   B. 11   C. 16   D. 22   E. NOTA

11. Solve for x: $\dfrac{x+3}{x-1} < \dfrac{x+5}{x+2}$

    A. $x < -11$ B. $x > -11$ C. $x < 11$ D. $x > 11$ E. NOTA

12. Find the product of the solutions to the equation:

$$\begin{vmatrix} x & 1 & 1 \\ 1 & x & 2 \\ 2 & 2 & x \end{vmatrix} = 0$$

    A. -6   B. -2   C. 2   D. 6   E. NOTA

13. Find $x - y$ if x and y are the solutions to the system:

$$3x + 4y = 24xy$$
$$9x - 8y = 12xy$$

    A. $-\dfrac{1}{12}$ B. -1 C. 1   D. $\dfrac{1}{12}$ E. NOTA

14. If $\dfrac{8x+7}{x^2 + x - 2} = \dfrac{A}{x+2} + \dfrac{B}{x-1}$, find $B - A$.

    A. -3 B. -2 C. 2   D. 3   E. NOTA

15. Find the sum of all distinct real solutions to: $(x^2 - 6x + 8)^{(x^2 - 3x + 2)} = 1$.

    A. 3   B. 7   C. 9   D. 12   E. NOTA

16. If $f(x) = x + \dfrac{30}{x}$ and $g(x) = x + 2$, find $f(g(3)) - g(f(3))$.

    A. −8   B. −4   C. 4   D. 8   E. NOTA

17. Solve for x: $\log_3 x + \log_9 x^2 = 4$.

    A. 3   B. 9   C. 27   D. 81   E. NOTA

18. Find the solution sets of $x^2 - 4x - 5 < 7$.

    A. $-1 < x < 5$ B. $x < 1$ and $x > 5$ E. NOTA

    C. $-2 < x < 6$ D. $x < 2$ and $x > 6$

19. Find the geometric mean to the solutions to: $x^3 - 13x^2 + 39x - 27 = 0$

    A. 3   B. $2\sqrt{3}$ C. 4   D. $3\sqrt{3}$ E. NOTA

20. Billy borrows P dollars from a bank. If interest is compounded every three months at a rate of 5%, how much will Billy owe after 10 years?

    A. $P\left(1 + \dfrac{.05}{3}\right)^{30}$ B. $P\left(1 + \dfrac{.05}{4}\right)^{40}$ E. NOTA

    C. $P\left(1 + \dfrac{.05}{10}\right)^{30}$ D. $P\left(1 + \dfrac{.05}{10}\right)^{40}$

21. If $f(2x) = x^2 + 2x + 3$, then find the product of the roots of $f(x)$

    A. $\dfrac{3}{4}$ B. $\dfrac{3}{2}$ C. 6   D. 12   E. NOTA

22. Find the product of the real solutions to the equation: $\ln x + \dfrac{7}{\ln x} = 6$.

    A. $\ln 6$ B. $\ln 7$ C. e^6 D. e^7 E. NOTA

23. What is the discriminant of $3x^2 - 5x + 1 = 0$?

    A. $\sqrt{13}$ B. 13   C. $\sqrt{37}$ D. 37   E. NOTA

24. How many real roots does $x^4 + 3x^2 - 4 = 0$ have?

    A. 1   B. 2   C. 3   D. 4   E. NOTA

25. How many integers x satisfy the inequality $11 \cdot |x-8| \le 3x$?

    A. 3   B. 4   C. 5   D. 6   E. NOTA

26. Find the sum of the coefficients in the binomial expansion of $(10x^2 - 8x^5)^4$.

    A. 2   B. 8   C. 16   D. 32   E. NOTA

27. How many asymptotes does the graph of $f(x)$ have, if $f(x) = \dfrac{(x-1)(x^2 + x - 6)}{(x-2)(x^2 + 3x + 2)}$?

    A. 1   B. 2   C. 3   D. 4   E. NOTA

28. What is the coefficient of the x^4 term in the binomial expansion of $\left(2x^2 - \dfrac{1}{x}\right)^5$?

    A. −80   B. −40   C. 40   D. 80   E. NOTA

29. If $X + Y = 20$, $Z + Y = 33$, and $Z + X = 55$, then what is the value of $X + Y + Z$?

    A. 27   B. 36   C. 54   D. 108   E. NOTA

30. Find $f(3)$ if $f(x) = x^2 + 7x - 3$.

    A. −15   B. −9   C. 27   D. 33   E. NOTA