Note: For all questions, answer "(E) NOTA" means none of the above answers is correct.

1. If $g(x) = 3x + 10$ evaluate $g(2)$.

   (A)   16   (B)   15   (C)   6   (D)   19   (E) NOTA

2. Which is not a function?

   (A)   {(1,1), (2,4), (5,7)}   (B) {(-4,-8), (-3, 11), (4,8)}   (C)   {(-5,10), (2,10), (5, 10)}
   (D)   {(3,-5), (3,2), (3,5)}   (E) NOTA

3. What is the slope of the line represented by $3y - 7x + 10 = 0$?

   (A) $\dfrac{-7}{3}$ (B) $\dfrac{-3}{7}$ (C) $\dfrac{10}{3}$ (D) $\dfrac{3}{10}$ (E) NOTA

4. If $f(x) = x^4 - 4$ and $g(x,y) = 42x^y$ find $g\big(f(2),4\big)$

   (A)   2016   (B)   870,912   (C)   704,643,072   (D)   524,128,256   (E) NOTA

5. Solve the system: $\begin{array}{l} 2x - 3y = 17 \\ 3x + 2y = 6 \end{array}$

   (A) $(3,-4)$ (B) $(3,4)$ (C) $(4,-3)$ (D) $(4,3)$ (E) NOTA

6. Write the standard form of the equation of the line through the points (-3,2) and (0,-1).

   (A) $x + y = 1$ (B) $x - y = -1$ (C) $x + y = -1$ (D) $x - y = 1$ (E) NOTA

7. If $p(a) = -4^{3a}$, find $p(-2)$

   (A) $-\dfrac{1}{4096}$ (B) $\dfrac{1}{4096}$ (C)   4096   (D)   -4096   (E) NOTA

8. The velocity (in feet per second) of an object fired directly upward is given by
   $V = 80 - 32t$, where t is in seconds. When will the velocity be 16 feet per second?

   (A) $t = 0.5$ (B) $t = 1$ (C) $t = 1.5$ (D) $t = 2$ (E) NOTA

9. Which of these points is above the point on the graph of $x^2 + y = 2$ with the same x-coordinate?

   (A) (2,-2)   (B) (4,-5)   (C) (0,0)   (D) (0,-1)   (E) NOTA

10. Find the inverse of function $h(x) = 2x^3 + 3$.

   (A) $h^{-1}(x) = \dfrac{1}{2x^3 + 3}$ (B) $h^{-1}(x) = \sqrt[3]{\dfrac{x+3}{2}}$ (C) $h^{-1}(x) = \sqrt[3]{\dfrac{x-3}{2}}$

   (D) $h^{-1}(x) = 2x^3 - 3$ (E) NOTA

11. $g(x) = \dfrac{5}{3} \cdot \left| -\dfrac{2}{3}x - \dfrac{5}{3} \right| + \dfrac{3}{2}$; find $g\left(\dfrac{4}{3}x\right)$

   (A) $\dfrac{10\left|\dfrac{-8x-15}{3}\right| + 9}{6}$ (B) $\dfrac{10\left|\dfrac{6x-19}{3}\right| + 9}{6}$ (C) $\dfrac{10\left|\dfrac{-8x-15}{9}\right| + 9}{6}$ (D) $\dfrac{10\left|\dfrac{6x-19}{9}\right| + 9}{6}$

   (E) NOTA

12. What is the equation of the translation of the function $y = \sqrt{x+1}$ up 7 spaces and 5 spaces to the left?

   (A) $y = \sqrt{x+7} - 5$ (B) $y = \sqrt{x-4} + 7$ (C) $y = \sqrt{x+5} + 7$ (D) $y = \sqrt{x+6} + 7$ (E) NOTA

13. The equation of the line parallel to $2y - x = x + 10$ and containing the point (3,10) is

   (A) $x - y + 7 = 0$ (B) $x - y - 7 = 0$ (C) $x = 0$ (D) $y = 7$ (E) NOTA

14. The slanted roof of a store makes a $45°$ angle with the horizontal ceiling of the shop. Letting the intersection of the roof and ceiling represent the origin and the roof be in the first quadrant, the equation of the line representing the roof is

   (A) $y = \dfrac{1}{2}x$ (B) $y = x$ (C) $y = 2x$ (D) $y = \dfrac{\sqrt{3}}{3}x$ (E) NOTA

15. $p(x) = x^2 - 2x$; find $p(6)$?

   (A) 120   (B) 80   (C) 24   (D) 3   (E) NOTA

16. At what point do the 3 lines intersect?

$$y = 2x + 3$$
$$x + y = 2$$
$$3y = -15x + 2$$

(A) $\left(\dfrac{1}{3}, \dfrac{7}{3}\right)$ (B) $\left(-\dfrac{1}{3}, -\dfrac{7}{3}\right)$ (C) $\left(\dfrac{1}{3}, -\dfrac{7}{3}\right)$ (D) $\left(-\dfrac{1}{3}, \dfrac{7}{3}\right)$ (E) NOTA

17. $\begin{aligned} f(n) &= n^2 - 3 \\ g(n) &= 3n + 2 \end{aligned}$; find $(f \circ g)(n^2)$?

(A) $9n^4 + 12n^2 - 1$ (B) $9n^4 - 12n^2 + 1$ (C) $3n^2 - 7$ (D) $3n^2 + 5$ (E) NOTA

18. Find the real value c that completes the square: $x^2 - \dfrac{25}{13}x + c$.

(A) $\dfrac{625}{676}$ (B) $\dfrac{625}{169}$ (C) $\dfrac{25}{169}$ (D) $\dfrac{25}{676}$ (E) NOTA

19. $f(n) = n^2 - 4n$; Find $f(-8)$

(A) 96   (B) 45   (C) 140   (D) -3   (E) NOTA

20. Find the inverse of the function $h(x) = \log_6(4x + 4)$

(A) $h^{-1}(x) = \log_6(4y + 4)$ (B) $h^{-1}(x) = \log_6(4x - 4)$ (C) $h^{-1}(x) = \dfrac{6^x + 4}{4}$

(D) $h^{-1}(x) = \dfrac{6^x - 4}{4}$ (E) NOTA

21. Factor completely over integers: $-27u^3 + 125$

(A) $(-3u + 5)\left(9u^2 - 15u + 25\right)$ (B) $(-3u + 5)\left(9u^2 + 15u + 25\right)$ (C) $(-3u + 5)$
(D) $(-3u - 5)$ (E) NOTA

22. $\begin{aligned} g(t) &= t - 4 \\ f(t) &= 4t \end{aligned}$; Find $(g - f)(3t)$

(A) $9t + 4$ (B) $-9t + 4$ (C) $-9t - 4$ (D) $9t - 4$ (E) NOTA

23. If $g(x) = g(x-3) + 2x$ and $g(4) = 12$ find $g(-5)$.

(A) 2   (B) 18   (C) 20   (D) 6   (E) NOTA

24. Find all the zeroes of $f(x) = x^3 - 2x^2 + x$

(A) $x = 0$ (B) $x = 1$ (C) $x = 2$ (D) $x = -1$ (E) NOTA

25. Which of the following are even functions of x?

I. $f(x) = \dfrac{x}{x^2 - 1}$ **II.** $f(x) = |x|$ **III.** $f(x) = \sin x$

(A) I only   (B) II only   (C) III only   (D) I, II, and III   (E) NOTA

26. $f(x) = 2015x^{2015} + 2015x^{2014} + 2015x^{2013} + 2015x^{2012} + \ldots + 2015x^2 + 2015x^1 + 2015x^0$. Find the remainder when $f(x)$ is divided by $x + 1$?

(A)   0   (B) -2015   (C) -1   (D)   1   (E) NOTA

27. $u(x) = x^2 - 4$, $v(x) = x + 3$, $w(x) = \dfrac{1}{x-1}$. Find $v\left(w^{-1}\left(u(-2)\right)\right)$?

(A) 2   (B) $\dfrac{28}{8}$ (C) Undefined   (D) $\dfrac{23}{6}$ (E) NOTA

28. Some surfboard designs are in the shape of the common area of two overlapping congruent circles. If each circle has a diameter of $2r$ feet and their common chord has a length of r feet, which equation represents the area of the surfboard in square feet?

(A) $A = \dfrac{2\pi r^2}{3} - \dfrac{r^2 \sqrt{3}}{2}$ (B) $A = \dfrac{\pi r^2}{3} - \dfrac{r^2 \sqrt{3}}{2}$ (C) $A = \dfrac{\pi r^2}{6} - \dfrac{r^2 \sqrt{3}}{4}$

(D) $A = \pi r^2 - r\sqrt{3}$ (E) NOTA

29. Calvin and Anna have just filled up their kiddie pool but before they can get in Baxter the bulldog comes running and jumps in, completely submerging himself! If the pool is a cylinder with a base area of 9π ft² then which equation represents Baxter's volume if he displaces the water by x inches?

(A) $9x\pi$ ft³   (B) $9x\pi$ in³   (C) $\dfrac{3x\pi}{4}$ ft³   (D) $\dfrac{3x\pi}{4}$ in³   (E) NOTA

30. Find the value of the discriminant of $x^2 - 7x + 12 = 0$?

(A)   49   (B)   1   (C)   -19   (D)   -41   (E) NOTA