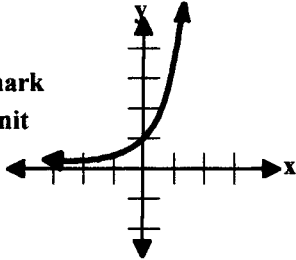


Note: "NOTA" means "none of these answers."

- What is the y-intercept of the line which contains the points $\left(\frac{3}{4}, 2\right)$ and $\left(\frac{1}{8}, -\frac{1}{2}\right)$?
 (A) $-\frac{1}{4}$ (B) -1 (C) $-\frac{5}{4}$ (D) $-\frac{3}{4}$ (E) NOTA
- If a relation is a "constant function," then it must be linear and ?.
 (A) have a slope of zero (B) a direct variation (C) contain the origin (D) have an undefined slope (E) NOTA
- Suppose A varies directly as r^2 and A is π when $r = \frac{1}{2}$. What is the value of A when r is 5?
 (A) 40π (B) $\frac{\pi}{100}$ (C) 100π (D) $\frac{\pi}{40}$ (E) NOTA
- Suppose $f: x \rightarrow \frac{2x-1}{3}$. Find the value of $f(-3)$.
 (A) $-6\frac{1}{3}$ (B) $1\frac{2}{3}$ (C) $5\frac{2}{3}$ (D) $-2\frac{1}{3}$ (E) NOTA
- Given: $\left(a, \frac{a}{2}\right) \in \{(x, y) : y = ax^2\}$ Find the value(s) of **a**.
 I. $\frac{\sqrt{2}}{2}$ II. $-\frac{\sqrt{2}}{2}$ III. 0
 (A) I only (B) I & II only (C) III only (D) I, II, & III (E) NOTA
- If $f(x) = 3x$ and $g(x) = x^2 - 1$, then find $g\left(f\left(\frac{-1}{a}\right)\right)$. (note: $a \neq 0$)
 (A) $\frac{9-a^2}{a^2}$ (B) 9 (C) $\frac{3-3a^2}{a^2}$ (D) 0 (E) NOTA
- If f is a function such that $f(x) = -x^2 + 1$ for all $x \in \mathcal{R}$, then $f(2-h) - f(h)$ is equal to ?.
 (A) $-4h^2 + 8h - 3$ (B) $4h - 2$ (C) $2h^2 + 4h - 4$ (D) $4h - 4$ (E) NOTA
- Suppose f is a function such that $f(x) = ax^2 + bx + c$, where $a \neq 0$. The graph of the function contains the points (1, 8) and (0, 17). The axis of symmetry is $x = 2$. Find the value of c .
 (A) -12 (B) 17 (C) 5 (D) 3 (E) NOTA
- The publisher of a magazine that has a circulation of 80,000 and sells for \$1.60 a copy decides to raise the price of the magazine because of increased production costs. By surveying the readers of the magazine, the publisher finds that the magazine will lose 10,000 readers for each \$0.40 increase in price. What price per copy maximizes the revenue?
 (A) \$2.40 (B) \$3.00 (C) \$3.20 (D) \$4.80 (E) NOTA
- For which of the following functions does $f(a+b) = f(a) + f(b)$?
 (A) $f(x) = x^2$ (B) $f(x) = \frac{1}{x}$ (C) $f(x) = 4x + 1$ (D) $f(x) = 3x$ (E) NOTA

11. Suppose w varies inversely as the square of z and z varies directly to the cube of x . What is the relationship between w and x ?
- (A) w is directly proportional to the sixth root of x
 (B) w is inversely proportional to the sixth root of x
 (C) w is directly proportional to the sixth power of x
 (D) w is inversely proportional to the sixth power of x
 (E) NOTA
12. The cost of parking a car in a municipal parking lot is \$3 for the first hour or any part thereof, plus \$2 for each additional hour or part thereof. Find a rule for the cost C as a function of time t . (note: $[t]$ represents the "greatest integer function" and $\lceil t \rceil$ represents the "rounding-up function")
- (A) $C(t) = 3 + 2\lceil t - 1 \rceil$; $t > 0$ (B) $C(t) = 3 + 2[t - 1]$; $t > 0$
 (C) $C(t) = 3 + 2\lceil t \rceil$; $t > 0$ (D) $C(t) = 3 + 2[t]$; $t > 0$ (E) NOTA
13. Find an integer c such that the function $f(x) = 4x^3 + cx - 27$ has a double root.
- (A) 27 (B) -27 (C) -36 (D) 9 (E) NOTA
14. The function $h(x) = -16x^2 + v_0x + s_0$ models the height of an object tossed upward where v_0 represents the initial velocity, s_0 represents the initial height, and x represents time. A golf ball is hit upward from ground level with an initial velocity of 72ft/sec. Find the maximum height that the ball reaches.
- (A) 79 ft. (B) 80 ft. (C) 81 ft. (D) 82 ft. (E) NOTA
15. If f is a function such that $f(x) = \log_2 x$, then $f(2x) = ?$.
- (A) $2f(x)$ (B) $f^2(x)$ (C) $f(x + 1)$ (D) $f(x) + 1$ (E) NOTA
16. If $f(x) = \frac{x}{x+1}$ where $x \neq -1$, then find $f^{-1}(x)$ where f^{-1} denotes the inverse function of f .
- (A) $\frac{x+1}{x}$; $x \neq 0$ (B) $\frac{x}{x+1}$; $x \neq -1$ (C) $\frac{x}{1-x}$; $x \neq 1$ (D) $\frac{x}{x-1}$; $x \neq 1$ (E) NOTA
17. If $g(x) = g(x - 2) + 3x$ and $g(3) = -5$, then find $g(9)$.
- (A) 91 (B) 58 (C) 31 (D) 10 (E) NOTA
18. Which equation best describes the graph shown to the right? **note: each tick mark represents one unit**
- (A) $y = \log(x)$ (B) $x = \ln(y)$
 (C) $y = \left(\frac{1}{2}\right)^{-x}$ (D) $x = \log(y)$ (E) NOTA
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19. If $f(x) = 2^x$, then which expression is equal to $f(x + 1)$?
- (A) $2^x + 2$ (B) 3^x (C) $2 + f(x)$ (D) $2 \cdot f(x)$ (E) NOTA
20. Suppose $f(x)$ is positive for all real x and $f(x + y) = f(x) \cdot f(y)$ for all x and y . Find an equation for a function that has the property that $f(x + y) = f(x) \cdot f(y)$ for all real x and y .
- (A) $f(x) = 2^x$ (B) $f(x) = 2x$ (C) $f(x) = x^2$ (D) $f(x) = \frac{2}{x}$; $x \neq 0$ (E) NOTA

21. A polynomial function $f(x)$ of degree four has roots at $-4, 0, 2,$ and 4 . The function $g(x) = f(x) + K$ has only one root, at $x = a$. What is the minimum value of $f(x)$? (**note:** $K > 0$)
 (A) K (B) $-K$ (C) a (D) $-a$ (E) NOTA
22. The table contains some ordered pairs of a function. The relationship is best described as ?.
- | | | | | | |
|-----|--------|-------|-------|-------|--------|
| x | -2 | -1 | 0 | 1 | 2 |
| y | -5.5 | 1.5 | 2.5 | 3.5 | 10.5 |
- (A) linear (B) quadratic (C) cubic (D) exponential (E) NOTA
23. Suppose the amount of money that you have accumulated in a bank account is a function of time and the account pays an 8% annual interest, compounded monthly. Also assume that you make only one deposit into this account. How much money must you initially deposit into this account in order to have a balance of \$1000 after one year? (Assume the bank will round to the nearest penny at the end of one year.)
 (A) \$923.07 (B) \$923.12 (C) \$923.36 (D) \$925.93 (E) NOTA
24. A piece of cardboard six inches by ten inches is made into an open box (with no top) by cutting out squares (with sides of length x) from each corner. Which expression represents $V(x)$, where $V(x)$ is equal to the volume of the box?
 (A) $x^3 - 16x^2 + 60x$ (B) $2x^3 - 22x^2 + 60x$ (C) $2x^3 - 26x^2 + 60x$ (D) $4x^3 - 32x^2 + 60x$ (E) NOTA
25. Suppose $f(x) = \frac{2x^2 - x - 6}{x^2 - 4}$. Find the equation(s) of the asymptotes for the graph of f .
 I. $x = -2$ II. $x = 2$ III. $y = 2$
 (A) I only (B) I & II only (C) I & III only (D) I, II & III (E) NOTA
26. The graphs of $f(x) = ax + b$ and $g(x) = bx - a$ are perpendicular lines. If $\frac{g(1)}{f(0)} = 10$, then what is the value of a ?
 (A) 3 (B) ± 3 (C) $\frac{1}{3}$ (D) $\pm \frac{1}{3}$ (E) NOTA
27. Suppose that h is an exponential function of the form $h(x) = a^x$ and $h(3) = 5$. What is the value of $h(-6)$?
 (A) -25 (B) -10 (C) $\frac{1}{25}$ (D) $\frac{1}{10}$ (E) NOTA
28. If $g(x) = x^2 - 5$ and $f(x) = 4x$, then find the sum of the ordinates for the intersection points of f and g .
 (A) 16 (B) 4 (C) 20 (D) -1 (E) NOTA
29. A function is said to be "even" if $f(x) = f(-x)$. Which of the following are **not** even functions?
 I. $f(x) = -|x^3|$ II. $f(x) = -x^4 + 2x^2 + 13$ III. $f(x) = 3x$ IV. $f(x) = 2x^3$
 (A) I & II (B) III & IV (C) II, III, & IV (D) I & IV (E) NOTA
30. Consider a function P where $P(x) = \frac{1}{6}x^2 - \frac{4}{3}x + \frac{2}{3}$. Now, find the equation of the line which contains the focus of the graph of P and the y-intercept of the graph of P .
 (A) $7x + 24y = 16$ (B) $2x + 3y = 2$ (C) $x + 24y = 16$ (D) $x - 6y = -4$ (E) NOTA