

1. What is $(3 + 2i)(3 - 2i)$?
(A) 5 (B) 7 (C) 9
(D) 13 (E) $9 - 4i$

2. What is $(3 - i)^2$?
(A) 8 (B) $9 - i$ (C) $6 - 7i$
(D) $8 - 6i$ (E) $6 - 8i$

3. If $x = \frac{2}{3}$, what is x^{-3} ?
(A) $-\frac{27}{8}$ (B) $-\frac{6}{9}$ (C) $-\frac{8}{27}$
(D) $\frac{9}{6}$ (E) $\frac{27}{8}$

4. Which value is not a solution of:
 $|x + 4| - 6 = 2$?
(A) 4 (B) -12 (C) -4
(D) all three are solutions
(E) none of them are solutions

5. Find the value of m if -3 is one root of $2x^2 + mx - 3 = 0$.
(A) 0.5 (B) 5 (C) 3
(D) 1 (E) none of these

6. Find the value of p if $x - 3$ is a factor of $x^2 + px + 12$.
(A) -7 (B) -1 (C) 1
(D) 7 (E) 9

7. If the product xm is constant, and $x = 4$ when $m = 7$, find the value of x when $m = 17.5$.
(A) 1.6 (B) 2.8 (C) 4.8
(D) 10 (E) 16

8. One solution of $(x - 1)^2 = 27$ has the form $1 + 3a$. Find a .
(A) $\sqrt{\frac{3}{2}}$ (B) $\frac{\sqrt{6}}{2}$ (C) $\sqrt{3}$
(D) $\sqrt{6}$ (E) none of these

9. Solve for x in terms of a , given that:
 $x + y = 4a + 7$ and $x - y = 2a + 5$.
(A) $2a + 2$ (B) $2a + 5$ (C) $2a + 6$
(D) $3a + 4$ (E) $3a + 6$

10. If the quotient is $x + 6$ (with a zero remainder) when $x + a$ is divided into $x^2 + 8x + k$, then $a =$?
(A) 21 (B) 13 (C) 2
(D) -7 (E) none of these

11. Find the y-intercept of the straight line through the points:

(-1, 1) and (3, 9)

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

12. For what value of k will the line through (3k, 1) and (-k, -3) have a slope of 3?

- (A) $-\frac{1}{3}$ (B) $\frac{1}{3}$ (C) -3
 (D) 3 (E) none of these

13. Find the value of $g(f(-a))$ if

$f(x) = 5x - 1$ and $g(x) = 2 + x^2$.

- (A) $25a^2 + 1$ (B) $25a^2 + 10a + 3$
 (C) $-(5a^3 + a^2 + 10a + 1)$
 (D) $5a^2 + 9$ (E) none of these

14. Which of the following is equivalent to $|2x - 3| > 7$?

- (A) $x < -2$ and $x > 5$ (B) $-2 < x < 5$
 (C) $x > 2$ or $x < 5$ (D) $x < -2$ or $x > 5$
 (E) none of these

15. Solve for a in terms of x.

$$(2 + \frac{1}{x})a = \frac{1}{x}$$

- (A) $\frac{1}{2}$ (B) $\frac{1}{2x + 1}$ (C) -2
 (D) $\frac{2}{2x + 1}$ (E) $\frac{2x + 1}{x^2}$

16. If the taxi fare is c cents for the first quarter mile and s cents for each additional quarter mile, what is the charge (in cents) for a trip (greater than 1/4 mile) of x miles?

- (A) $c + sx$ (B) $c + s(4x - 1)$
 (C) sx (D) $c + s(x - 1)$
 (E) $(c - 1)s + x$

17. For what value of d will the point (4, d) be on the line through: (-1, 3) and (1, 1)?

- (A) -2 (B) -3 (C) -4
 (D) -5 (E) none of these

18. Find the numerator of the remainder term when $3x^2 - 4x + 2$ is divided by $x^2 + x - 1$.

- (A) $7x - 5$ (B) $x + 5$ (C) $-x + 1$
 (D) $x - 1$ (E) $-7x + 5$

19. Find the value of t in the solution of the system:

$$\frac{3}{u} + \frac{2}{t} = 16$$

$$\frac{1}{u} + \frac{3}{t} = 17$$

- (A) $\frac{1}{2}$ (B) $\frac{1}{3}$ (C) $\frac{1}{4}$
 (D) $\frac{1}{5}$ (E) none of these

20. The graph of the function:

$$f(x) = -(x - 6)^2 - 4$$

is a parabola with its vertex at V , which opens as follows:

- (A) $V: (6, -4)$; opens upward
 (B) $V: (-6, 4)$; opens upward
 (C) $V: (6, -4)$; opens downward
 (D) $V: (-6, 4)$; opens downward
 (E) None of these

21. The equation of the circle passing through the point $(1, -3)$ with its center at $(-4, 2)$ is:

- (A) $(x - 1)^2 + (y + 3)^2 = 51$
 (B) $(x - 1)^2 + (y - 1)^2 = 44$
 (C) $(x + 4)^2 + (y - 2)^2 = 50$
 (D) $(x + 4)^2 - (y - 2)^2 = 50$
 (E) $(x - 2)^2 + (y - 4)^2 = 50$

22. If $x^2 - y^2 = 0$, which of the following is true?

- (A) $x = y$
 (B) x and y both equal zero
 (C) $x = -y$
 (D) all of the above
 (E) none of these

23. What is $\frac{3 + 2i}{-3 + 4i}$?

- (A) $-\frac{1}{25} + \frac{18}{25}i$
 (B) $-\frac{1}{25} - \frac{18}{25}i$
 (C) $\frac{18}{25} - \frac{1}{25}i$
 (D) $\frac{18}{25} + \frac{1}{25}i$
 (E) Not defined

24. If $2x - 1$ is a factor of $2x^3 + x^2 - 5x + 2$,

then the other two factors are :

- (A) $(x - 1), (x - 2)$
 (B) $(x + 1), (x + 2)$
 (C) $(x - 1), (x + 2)$
 (D) $(x + 1), (x - 2)$
 (E) None of these

25. How many quarts of a 90% alcohol solution should be mixed with a 75% solution to make 20 quarts of a 78% alcohol solution?

- (A) 4 (B) 9 (C) 11
 (D) 15 (E) 16

26. Solve the inequality: $x^2 + 5x + 6 < 2$

- (A) all x (B) $x < -4$ or $x > -1$
 (C) $x > 0$ (D) $-4 < x < -1$
 (E) none of these

27. Which of the following is not in the solution set of:

$$x(2x - 3) > -(6 + 5x - 2x^2) ?$$

- (A) 0 (B) -1
 (C) -2 (D) -3
 (E) all are in the solution set.

28. Which of the following equations has a solution that is not a real number?

- (A) $x + 7 = \pi$ (B) $x / \pi = 7$
 (C) $x^2 + \pi = 4$ (D) $x^2 - 7 = \pi$
 (E) $x^2 + 7 = \pi$

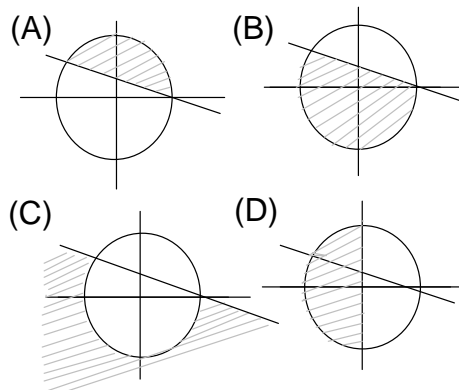
29. If $10^{x^2+x} = 10^{6x-4}$, then:

- (A) $x = -4$ or $x = -1$
 (B) $x = 0$ or $x = -2$
 (C) $x = -4$ or $x = 3$
 (D) $x = 4$ or $x = 1$
 (E) none of these

30. Given: $\sqrt{x^2y^2 + x^3y^4} = 3xy$. Find xy^2

- (A) $3/2$ (B) 4 (C) 8
 (D) 16 (E) 64

31. Graph these inequalities:
 $x^2 + y^2 \leq 9$ and $y \geq 1 - 0.25x$



- (E) none of these

32. What is the smallest real number that can be the sum of a positive real number and its reciprocal?

- (A) 1 (B) 2 (C) $2\frac{1}{2}$
 (D) $\frac{3\sqrt{2}}{2}$ (E) none of these

33. Factor completely: $2x^3 + 5x^2 + x - 2$

- (A) $(2x - 1)(x + 1)(x - 2)$
 (B) $(2x - 1)(x + 1)(x + 2)$
 (C) $(2x + 1)(x + 1)(x + 2)$
 (D) $(2x + 1)(x - 1)(x + 2)$
 (E) $(2x + 1)(x - 1)(x - 2)$

34. What is the exact value of the exponential e ?

- (A) 2.718 (B) 2.7182819
(C) 2.71828 (D) 2.718281828
(E) none of these

38. If the reciprocal of $x + 1$ is $x - 1$, then what is the value of x ?

- (A) 0 (B) 1 (C) -1
(D) ± 1 (E) none of these

35. Find the value of the following:

$$\left(\frac{1+i}{1-i}\right)^2$$

- (A) 0 (B) 1 (C) -1
(D) i (E) none of these

39. Find the value of x in:

$$\log_3 x + \log_3 (2 - x) = 0$$

- (A) 0 (B) 1 (C) -1
(D) ± 1 (E) none of these

36. Which of the following defines $a \circ b$ as a commutative operation on the set of integers? $a \circ b = \underline{\hspace{2cm}}$

- (A) $a(b + 1)$ (B) $2a + 3b$
(C) $a^b + b^a$ (D) a^b
(E) a^2b^3

40. Which of the following is equivalent

to $(a - b)^2 > 0$:

- (A) $\frac{a^2 + b^2}{2} > ab$ (B) $\frac{a^2 - b^2}{2} > ab$
(C) $a^2 + b^2 > 3ab$ (D) $a^3 + b^3 \leq 3ab$
(E) $a^2 - b^2 + 2 > ab$

37. The equation $x^3 + 6x^2 + 11x + 6 = 0$ has:

- (A) no negative real roots
(B) no real roots
(C) no positive real roots
(D) 1 positive and 2 negative roots
(E) 1 negative and 2 positive roots