



Quant 6 – Live Session

Inequalities + Mods

You must have solved each of the questions extremely thoroughly before the live class

1.

Which of the following represents the complete range of x over which $x^3 - 4x^5 < 0$?

- (A) $0 < |x| < \frac{1}{2}$
- (B) $|x| > \frac{1}{2}$
- (C) $-\frac{1}{2} < x < 0$ or $\frac{1}{2} < x$
- (D) $x < -\frac{1}{2}$ or $0 < x < \frac{1}{2}$
- (E) $x < -\frac{1}{2}$ or $x > 0$

2.

If x is an integer, how many possible values of x exist for $x^2 + 5|x| + 6 = 0$?

- A. 4
- B. 2
- C. 3
- D. 1
- E. 0

3.

If $x < y < z$ but $x^2 > y^2 > z^2 > 0$, which of the following must be positive?

- (A) $x^3y^4z^5$
- (B) $x^3y^5z^4$
- (C) $x^4y^3z^5$
- (D) $x^4y^5z^3$
- (E) $x^5y^4z^3$

4.

What is the range of all the roots of $|x^2 - 2| = x$?

- A. 4
- B. 3
- C. 2
- D. 1
- E. 0

5.

If $x^{3.5} > y^{2.5} > z^{1.5}$, then which of the following cannot be true?

- (A) $x > y > z$
- (B) $x < y < z$
- (C) $x^3 < y^2 < z$
- (D) $x^7 < y^5 < z^3$
- (E) $x^{10.5} > y^{7.5} > z^{4.5}$

6.

If $\frac{x}{|x|} < x$ which of the following must be true about x ?

- (A) $x > 1$
- (B) $x > -1$
- (C) $|x| < 1$
- (D) $|x| = 1$
- (E) $|x|^2 > 1$

7.

If $x^3 = 25$, $y^4 = 64$, and $z^5 = 216$, and $xy > 0$, which of the following is true?

- (A) $x > y > z$
- (B) $y > x > z$
- (C) $y > z > x$
- (D) $z > y > x$
- (E) $z > x > y$

8.

How many real numbers x satisfy the inequality below?

$$|x^4 - 4x^2 - 6| \geq |x^4 - 4x^2 + 14|$$

- A. 0
- B. 1
- C. 2
- D. 4
- E. Infinitely many

9.

If $(a - b) \times c < 0$, which of the following cannot be true?

- A. $a < b$
- B. $c < 0$
- C. $|c| < 1$
- D. $ac > bc$
- E. $a^2 - b^2 > 0$

10.

Let S be the set of all points (x, y) in the xy plane such that $|x| + |y| \leq 2$ and $|x| \geq 1$. Then what is the area of the region represented by S ?

- A. $1/2$
- B. 1
- C. 2
- D. 3
- E. 4

11.

If $b < c < d$ and $c > 0$, which of the following cannot be true if b, c and d are integers?

- A. $bcd > 0$
- B. $b + cd < 0$
- C. $b - cd > 0$
- D. $b / (cd) < 0$
- E. $b^3cd < 0$

12.

If $y = |x + 5| - |x - 5|$, then y can take how many integer values?

- A. 5
- B. 10
- C. 11
- D. 20
- E. 21

13.

If $\frac{x^3}{y} < 0$, and $\frac{y}{z} > 0$, then which of the following must be less than 1?

☐ $\sqrt[3]{x}$

☐ $\frac{y}{x^2}$

☐ $x^3 z^4$

☐ $x^2 y z$

☐ $x y^2 z^3$

14.

In the x - y plane, find the area (in sq. units) of the region enclosed by the graph of $|x-1| + |y+2|=3$.

A. 4.5

B. 9

C. 18

D. 36

E. 42

15.

How many integers between 2 and 8 satisfy the equation: $|x-2| - |x-3| = |x-5|$?

A. 1

B. 2

C. 3

D. 4

E. 5

16.

If $\frac{m^4}{|m|} < \sqrt{m^2}$, then which of the following must be true?

I. $m < \pi$

II. $m^2 < 1$

III. $m^3 > -8$

A. I only

B. II only

C. III only

D. I and II only

E. I, II, and III

17.

If $|x| < x^2$, which of the following must be true?

- A. $x > 0$
- B. $x < 0$
- C. $x > 1$
- D. $-1 < x < 1$
- E. $x^2 > 1$

18.

If $x \neq 0$ and $\frac{x}{|x|} < x$, which of the following must be true?

- (A) $x > 1$
- (B) $x > -1$
- (C) $|x| < 1$
- (D) $|x| > 1$
- (E) $-1 < x < 0$

19.

If $ab > cd$ and a, b, c and d are all greater than zero, which of the following CANNOT be true?

- A. $c > b$
- B. $d > a$
- C. $b/c < d/a$
- D. $a/c > d/b$
- E. $(cd)^2 < (ab)^2$

20.

If $|x| < x^2$, which of the following must be true?

I. $x^2 > 1$

II. $x > 0$

III. $x < -1$

(A) I only

(B) II only

(C) III only

(D) I and II only

(E) I and III only

21.

If $|x - (9/2)| = 5/2$, and if y is the median of a set of p consecutive integers, where p is odd, which of the following must be true?

I. xyp is odd

II. $xy(p^2 + p)$ is even

III. $x^2y^2p^2$ is even

A. II only

B. III only

C. I and III

D. II and III

E. I, II, and III

22.

For any non-zero a and b that satisfy $|ab| = ab$ and $|a| = -a$, the value of $|b - 4| + |ab - b| = ?$

A. $ab - 4$

B. $2b - ab - 4$

C. $ab + 4$

D. $ab - 2b + 4$

E. $4 - ab$

23.

If q , r , and s are consecutive even integers and $q < r < s$, which of the following CANNOT be the value of

$$s^2 - r^2 - q^2?$$

- A. -20
- B. 0
- C. 8
- D. 12
- E. 16

24.

If $\frac{x}{|x|} < x$, which of the following must be true about x ? ($x \neq 0$)

- A. $x > 2$
- B. $x \in (-1, 0) \cup (1, \infty)$
- C. $|x| < 1$
- D. $|x| = 1$
- E. $|x|^2 > 1$

25.

If $\frac{6}{x(x+1)} > 1$, which of the following could the value of x ?

- A. -3.5
- B. -2.5
- C. 2.5
- D. 3.5
- E. 4.5

26.

What is the median of all the values of x , which satisfy $||x - 3| - 5| = 3$?

- A. 1
- B. 2
- C. 3
- D. 5
- E. 6

27.

If z is an integer such that $||z - 30| - 43| = 6^2$ which of the following could be value of $|r|$, where r is the remainder obtained when z is divided by 7?

- I. 0
- II. 2
- III. 4

- A. I and II only
- B. I and III only
- C. II and III only
- D. I, II and III
- E. None of the above

28.

If $x + |x| + y = 7$ and $x + |y| - y = 6$, then $x + y =$

- A. 3
- B. 4
- C. 5
- D. 6
- E. 9

29.

If x is an integer, what is the probability that a number chosen at random from the possible values that satisfy the inequality: $-9 + x^2 \leq 0$, also satisfies $x \times |x| < 0$?

- A. $3/7$
- B. $1/2$
- C. $2/3$
- D. $1/4$
- E. $3/4$

30.

Consider a, b, c in a G.P. such that $|a + b + c| = 15$. The median of these three terms is a , and $b = 10$. If $a > c$, what is the product of the first 4 terms of this G.P.?

- A. 8,000
- B. 16,000
- C. 32,000
- D. 40,000
- E. 48,000

31.

If x is a non-negative integer and $|6 - |x + 2|| = 10$, then find the number of values of x that satisfy the equation?

- A. 0
- B. 1
- C. 2
- D. 3
- E. 4

32.

If $|3-x| < x+5$, which of the following must be true about x ?

- I. $x > -1$
- II. $x < 2$
- III. $x > 0$

- A. I only
- B. II only
- C. III only
- D. I and III only
- E. I, II, and III

33.

If $-1 < x < 0$, which of the following must be true?

- I. $x^3 < x^2$
- II. $x^5 < 1 - x$
- III. $x^4 < x^2$

- A. I only
- B. I and II only
- C. II and III only
- D. I and III only
- E. I, II and III

34.

If $|-1 - x| \leq 3$, where x is a positive integer, what is the smallest possible value of x ?

- A. -5
- B. -4
- C. 1
- D. 3
- E. 4

35.

Which of the following expressions CANNOT have a negative value?

- A. $a^2 + b^2 - 2|ab|$
- B. $|a + b| - |a - b|$
- C. $|a + b| - |a|$
- D. $|2a + b| - |a + b|$
- E. $|a^3 + b^3| - a - b$

36.

If n is not 0, for how many integers is $|n|^n = n \times n$?

- (A) 0
- (B) 1
- (C) 2
- (D) 3
- (E) more than 3

37.

If $y = \frac{|3x-5|}{-x^2-3}$ for what value of x will the value of y be greatest?

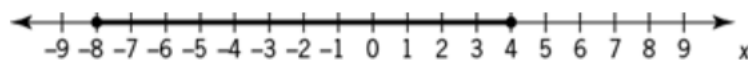
- A. -5
- B. $-3/5$
- C. 0
- D. $3/5$
- E. $5/3$

38.

If $|p - 5| = 3$ and $|q - 3| = 5$, which of the following statements must be true?

- A. $p + q > 0$
- B. $pq \geq 0$
- C. $|p| = |q|$
- D. $|p| \geq |q|$
- E. $-6 \leq p - q \leq 10$

39.



On the number line, the shaded interval is the graph of which of the following inequalities?

- A. $|x| \leq 4$
- B. $|x| \leq 8$
- C. $|x - 2| \leq 4$
- D. $|x - 2| \leq 6$
- E. $|x + 2| \leq 6$

40.

If $2^x + 2^y = x^2 + y^2$, where x and y are nonnegative integers, what is the greatest possible value of $|x - y|$?

- (A) 0
- (B) 1
- (C) 2
- (D) 3
- (E) 4

41.

How many real solutions exist for the equation $x^2 - 11|x| - 60 = 0$?

- A. 4
- B. 3
- C. 2
- D. 1
- E. 0

42.

For how many pairs (x, y) that are solutions of the system of equations $2x + y = 12$ and $|y| \leq 12$ are x and y both integers?

- A. 17
- B. 10
- C. 12
- D. 13
- E. 14

43.

If $y = |x - 1|$ and $y = 3x + 3$, then the sum of all possible values of x is:

- (A) $-5/2$
- (B) -2
- (C) $-1/2$
- (D) $1/2$
- (E) 2

44.

$|k|$ is a prime number.

x and k are both integers

$x > k$

$x^{-k} = 625$

What is the value of x ?

- A. 2
- B. -2
- C. 5
- D. -5
- E. 25

45.

If $|ab| > ab$, which of the following must be true?

- | | | |
|------------|-------------|---------------|
| I. $a < 0$ | II. $b < 0$ | III. $ab < 0$ |
| I only | II only | III only |
| I and III | II and III | |

46.

Which of the following inequalities has a solution set that when graphed on the number line, is a single segment of finite length?

- A. $x^4 \geq 1$ B. $x^3 \leq 27$ C. $x^2 \geq 16$
D. $2 \leq |x| \leq 5$ E. $2 \leq 3x + 4 \leq 6$

47.

$x^2 - 8x + 21 = |x - 4| + 5$. If the various values of x obtained from the equation above are the sides of a triangle, then the triangle must be:

- A. An acute-angled triangle
B. An obtuse-angled triangle
C. A right-angled triangle
D. An isosceles triangle
E. An equilateral triangle

48.

If $|x|/|3| > 1$, which of the following must be true?

- A. $x > 3$
B. $x < 3$
C. $x = 3$
D. $x \neq 3$
E. $x < -3$

49.

If $\sqrt{[(x + 4)^2]} = 3$, which of the following could be the value of $x - 4$?
-11 -7 -4 -3 5

50.

If $x > y^2 > z^4$, which of the following statements could be true?

- I. $x > y > z$ II. $z > y > x$ III. $x > z > y$
A. I only B. I and II only C. I and III only
D. II and III only E. I, II, and III

51.

If x is positive which of the following could be correct ordering of $1/x$, $2x$, x^2 ?

- I. $x^2 < 2x < 1/x$ II. $x^2 < 1/x < 2x$ III. $2x < x^2 < 1/x$
A. None B. I Only C. III Only D. I and II only E. I, II & III

52.

If $|1 - x| = 6$ and $|2y - 6| = 10$, which of the following could NOT be the value of xy ?

- A. -40
B. -14
C. 10
D. 56
E. None of these

53.

Which of the following equations has exactly one solution?

- A. $x|x| = 2^x$
- B. $x + |x| = 2^x$
- C. $2|x| = 2^x$
- D. $2|x| = 2x - 1$
- E. $|x + 2| = -x$

54.

If $2 < |5 - z| < 5$, which of the following could be the value of z ?

- A. 1
- B. 3
- C. 5
- D. 7
- E. 11

55.

If n is an integer such that $(-3)^{-4n} > 3^{6-n}$, which of the following is a possible value of n ?

- A. -5
- B. -1
- C. 1
- D. 3
- E. 5

56.

What is the smallest integer k such that $\frac{3^{1-k}}{3000} < 1$?

- A. -2
- B. -3
- C. -4
- D. -5
- E. -6

57.

If $0 < a < 1 < b$, which of the following is greatest?

- A. a/b
- B. $b - a$
- C. $1 - b$
- D. $(b/a)^2$
- E. It cannot be determined from the information given.

58.

How many of the integers that satisfy the inequality $(x + 2)^2(x + 3)(x - 1) \leq 0$ are less than 0?

- A. One
- B. Two
- C. Three
- D. Four
- E. Five

59.

If $a/b > c/d > 1$, which of the following could be true?

- A. $1/b > 1/a > 0 > 1/c > 1/d$
- B. $1/a > 1/b > 0 > 1/c > 1/d$
- C. $1/b > 1/a > 0 > 1/d > 1/c$
- D. $1/c > 1/a > 0 > 1/b > 1/d$
- E. $1/d > 1/c > 0 > 1/b > 1/a$

60.

If $-8 \leq x \leq 2$ and $-4 \leq y \leq 10$ which of the following represents the range of all possible values of xy ?

- A. $-8 \leq xy \leq 20$
- B. $-32 \leq xy \leq 20$
- C. $-80 \leq xy \leq 32$
- D. $-8 \leq xy \leq 32$
- E. $-80 \leq xy \leq 80$

Answerkeys

1. C
2. E
3. B
4. D
5. D
6. B
7. E
8. C
9. D
10. C
11. C
12. E
13. E
14. C
15. B
16. E
17. E
18. B
19. C
20. A
21. A
22. D
23. C
24. B
25. B
26. C
27. D
28. A
29. A
30. D
31. B
32. A
33. E
34. C
35. A
36. D
37. E
38. E
39. E
40. D
41. C
42. D
43. C
44. E
45. C

- 46. E
- 47. C
- 48. D
- 49. A
- 50. E
- 51. D
- 52. E
- 53. E
- 54. A
- 55. A
- 56. E
- 57. D
- 58. C
- 59. A
- 60. C