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Subject:

Chapter:

Category:

Numerical Methods and Algebra – Practice Questions 2

Topics: Inequalities, Modulus function, Quadratic

1. Solve for x:

$$4x + 15 < 23$$

   a. $x < 2$
   b. $x > 2$
   c. $x < 8$
   d. $x > 8$

Solution

$4x + 15 < 23$

$4x + 15 - 15 < 23 - 15$

$4x < 8$

$\frac{4x}{4} < \frac{8}{4}$

$x < 2$

2. Solve for all positive value of x:

$$x^2 - 3 > 25$$

   a. $[0,5)$
   b. $(\sqrt{28}, \infty)$
   c. $[\sqrt{28}, \infty)$
   d. $(0,5)$

Solution

$x^2 - 3 > 25$

$x^2 - 3 + 3 > 25 + 3$

$x^2 > 28$

Since we only need to solve for positive values of x, we get

$x > \sqrt{28}$

$x \in (\sqrt{28}, \infty)$

3. If $-7 \leq x < 6$ and $-5 \leq y \leq 8$, what are the maximum and minimum possible values of xy

a. Maximum: 48 Minimum: 35
b. Maximum: 56, Minimum: -30
c. Maximum: 48, Minimum: -56
d. Maximum: -30 Minimum: -56

4. Solve for y

$$5y + 3 \geq -7y + 13$$

a. $y \leq 10/12$
b. $y \geq 10/12$
c. $y \geq 12/10$
d. y<=12/10

Solution

$$\mathbf{5y + 3 \geq -7y + 13}$$

$$\mathbf{12y \geq 10}$$

$$\mathbf{\frac{12y}{12} \geq \frac{10}{12}}$$

$$\mathbf{y \geq \frac{10}{12}}$$

5. If r is a real number such that | r | < 1 and if a = 5 (1 – r), then
a. $-5 < a < 5$
b. $0 < a < 5$
c. $0 < a < 10$
d. $0 \leq a < 10$

Solution

$$|r| < 1$$
$$-1 < r < 1$$

Multiplying by -1

$$1 > -r > -1$$
$$1 + 1 > 1 - r > 1 - 1$$
$$2 > (1 - r) > 0$$

Multiplying by 5

$$10 > 5(1 - r) > 0$$
$$10 > a > 0$$

6. The roots of $x^2 - 6x + 12$ are
a. Real and distinct
b. Real and coinciding
c. Complex

d. Cannot be determined

Solution

$b^2 - 4ac = (-6)^2 - 4 \times 12 \times 1 = 36 - 48 = -12$

7. The roots of $5x^2 - 10x + 20 = 0$ are
   a. Real and distinct
   b. Real and coincident
   c. Complex
   d. Cannot be determined

Solution

$b^2 - 4ac = (-10)^2 - 4 \times 20 \times 1 = 100 - 80 = 20$

8. Which of the following is a quadratic equation?
   a. $x^2 - 4x + 5 = x^2 + 8x - 3$
   b. $x^2 + x^3 + 7 = 0$
   c. $x^2 + \sqrt{x} - 3 = 0$
   d. $x^2 - 4 = 0$

9. The polynomial equation $(x - 1)(x - 2) = x(x + 1)$ is a
   a. Quadratic equation
   b. Linear equation
   c. Cubic equation
   d. None of the above

10. The quadratic equation whose roots are 1 and -3 is
    a. $x^2 - 2x - 3 = 0$
    b. $x^2 + 2x + 3 = 0$
    c. $x^2 - 2x + 3 = 0$
    d. $x^2 + 2x - 3 = 0$

11. Solve the inequality $|2x - 5| > |x + 1|$

12. Plot the modulus function $f(x) = 2|3x + 7|$ in the interval x belongs to [-4,4]

13. Solve the quadratic equation $4x^2 - 4x - 3 = 0$ by factorization, formula and by completion of squares method.

14. The product of two number is 91 while the difference between them is 5. Find the two numbers.

15. Solve the quadratic inequality $x^2 - 6x - 16 \leq 0$

16. Solve for all real values of x, $x^4 + 2x^2 - 3 = 0$

17. Solve
    a. $\frac{1}{x^2+2x-8} > 0$
    b. $-x^2 - 8x - 12 \leq 0$
    c. $x^2 + 6x - 7 \geq 0$