

Chapter: - Linear Inequalities, Mathematical Reasoning, Sets and Statistics

Q1. The cost and revenue functions of a product are given by $C(x) = 20x + 4000$ and $R(x) = 60x + 2000$, respectively, where x is the number of items produced and sold. How many items must be sold to realise some profit?

Ans. $x > 50$,

Q2. Solve the following system of inequalities: $-\frac{x}{2x+1} \geq \frac{1}{4}$, $\frac{6x}{4x-1} < \frac{1}{2}$, **Ans.** No solution

Q3. Solve for x , If $\frac{x-2}{x-4} \geq 0$, **Ans.** $x \in (-\infty, 2] \cup (4, \infty)$

Q4. Solve for x , If $\frac{x+6}{x+2} \leq 0$, **Ans.** $x \in [-6, -2)$

Q5. Solve for x , If $\frac{x+3}{x-7} < 0$, **Ans.** $x \in (-3, 7)$

Q6. Solve for x , If $|x| < 4$, **Ans.** $x \in (-4, 4)$

Q7. Solve for x , If $|3x-7| \leq 2$, **Ans.** $x \in [\frac{5}{3}, 3]$

Q8. Solve for x , If $|x+1| + |x| > 3$, **Ans.** $x \in (-\infty, -2) \cup (1, \infty)$

Q9. Solve for x , If $\frac{|x+3| + x}{x+2} > 1$, **Ans.** $x \in (-5, -2) \cup (-1, \infty)$

Q10. Solve the following system of linear inequalities: $-3x+2y \geq 24$, $3x+y \leq 15$, $x \geq 4$, **Ans.** No solution.

Q11. Show that the solution set of the following system of linear inequalities is an unbounded region: $-2x+y \geq 8$, $x+2y \geq 10$, $x, y \geq 0$,

Q12. In drilling world's deepest hole it was found that the temperature T in degree Celsius, x km below the earth's surface was given by $T = 30 + 25(x-3)$, $3 \leq x \leq 15$, at what depth will the temperature be between 155°C and 255°C ? **Ans.** between 8 km and 12 km

Q13. Give an example of (I) statement (II) Simple Statement (III) Compound Statement,

Q14. Form the conjunction of the following simple statements: p ; Ram is a boy, q : Sita is a girl, **Ans.** $p \wedge q$

Q15. Form the disjunction of the following simple statements: p ; the sun shines, q : It rains, **Ans.** $p \vee q$,

Q16. Write the negation of the statement: p : New Delhi is a city, **Ans.** $\sim p$

Q17. Calculate the Mean deviation about Median for the following data:-

Class interval 0-6 6-12 12-18 18-24 24-30

Frequency 4 5 3 6 2 **Ans.** Med=14, M.D=7.

Q18. Find the Mean, Variance and S.D. for the following frequency distribution

P. T. O.

Classes 0-10 10-20 20-30 30-40 40-50 50-60

Frequency 11 29 18 4 5 3 **Ans.** 21, 161.4, 12.7

Q19. Calculate the Mean deviation about Mean for the following data

Class interval 0-4 4-8 8-12 12-16 16-20

Frequency 4 6 8 5 2 **Ans.** Mean=9.2, M.D=3.84,

Q20. Mean and S.D of 100 items are 50 and 4 respectively, find the sum of all the items and the sum of the square of the items. **Ans.** 5000, 251600

Q21. Define following with example:- Set, Set Theory, Roaster/Tabular form, Set builder form, Empty set, Singleton set, Finite set, Infinite set, Equal set, Subset, Super set, Open interval, Close interval, Half close interval, Half open interval, Equal set, power set, Universal set, Venn diagram, Union of set, Intersection of set, Complement of a set, Difference of sets and Disjoint set.

Q22. If $\Omega = \{a, b, c, d, e, f, g, h\}$, $A = \{b, c\}$, $B = \{c, d, e\}$, $C = \{c, g, h\}$, then State and verify De Morgan's rule for two and three sets

Q23. In a survey of 25 students, it was found that 15 had taken Mathematics, 12 had taken Physics and 11 had taken Chemistry, 5 had taken Mathematics and Chemistry, 9 had taken Mathematics and Physics, 4 had taken Physics and Chemistry and 3 had taken all the three subjects. Find the number of students that had taken,

(i) Only Chemistry, (ii) only Mathematics, (iii) Only Physics (iv) Physics and Chemistry but not Mathematics (v) Mathematics and Physics but not Chemistry (vi) Mathematics and Chemistry but not Physics (vii) Only one of the subjects (viii) At least one of the three subjects (ix) None of the subjects. **Ans.** 5, 4, 2, 1, 6, 2, 11, 23, 2

Q24. If $A = \{1, 2, 3, 4, 5\}$, $B = \{1, 3, 5, 8\}$, $C = \{2, 5, 7, 8\}$, then verify the following:-

$$(i) A - (B \cup C) = (A - B) \cap (A - C) \quad (ii) A - (B \cap C) = (A - B) \cup (A - C)$$

$$(iii) A \cap (B - C) = (A \cap B) - (A \cap C) \quad (IV) A \cup B = (A - B) \cup B$$

$$(v) A \cup (B \cap C) = (A \cup B) \cap (A \cup C) \quad (VI) A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$$

Q25. Life of bulbs produced by two factories A and B are given below:-

Length of life (in hrs) 550-650 650-750 750-850 850-950 950-1000

Factory A (No of bulbs) 10 22 52 20 16

Factory B (No of bulbs) 8 60 24 16 12

The bulbs of which factory are more consistent from the point of view of length of life? **Ans.** Factory A.

Q26. Determine mean and S.D of first n terms of an A.P. Whose first term is 'a' and common difference is 'd'

$$\text{Ans. Mean} = a + \frac{d(n-1)}{2}, \text{ S. D} = d \sqrt{\frac{n^2-1}{12}},$$

Q27. A and B are two sets such that $n(A) = 3$ and $n(B) = 6$, find (i) minimum value of $n(A \cup B)$, (ii) maximum value of $n(A \cup B)$, **Ans.** 6, 9,

Q28. Two finite sets have m and n elements. The total number of subsets of the first set is 56 more than the total number of subsets of the second set. Find the value of m and n. **Ans.** $m=6$, $n=3$,

Q29. Let A and B be two sets such that $n(A) = 20$, $n(A \cup B) = 42$, and $n(A \cap B) = 4$, find (i) $n(B)$, (ii) $n(A-B)$ (iii) $n(B-A)$, **Ans.** 26, 16, 22,

-----Best of luck-----

www.studiestoday.com