NTS GAT General Past Papers Questions

Quantitative – Exam No. 22

Factorization

Prepared by: GAT Online Tutor

Formula:

$$ax^2 + bx + c = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Exercise:

1. Factorize:

$$x^2 + 4x + 3 = 0$$

Solution:

Comparing the above equation with the standard form i.e. $ax^2 + bx + c = 0$, we get:

$$a = 1 \quad ; \quad b = 4 \quad ; \quad c = 3$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-4 \pm \sqrt{(4)^2 - 4(1)(3)}}{2(1)}$$

$$x = \frac{-4 \pm \sqrt{16 - 12}}{2}$$

$$x = \frac{-4 \pm \sqrt{4}}{2}$$

$$x = \frac{-4 \pm 2}{2}$$

$$x = \frac{-4 + 2}{2} \qquad\qquad x = \frac{-4 - 2}{2}$$

$$x = \frac{-2}{2} = -1 \qquad\qquad x = \frac{-6}{2} = -3$$

$$x = (-1, -3)$$

$$x^2 + 4x + 3 = (x + 1)(x + 3)$$

2. Factorize: (PP)

$$x^2 + x - 6 = 0$$

Solution:

Comparing the above equation with the standard form i.e. $ax^2 + bx + c = 0$, we get:

$$a = 1 \quad ; \quad b = 1 \quad ; \quad c = -6$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-1 \pm \sqrt{(1)^2 - 4(1)(-6)}}{2(1)}$$

$$x = \frac{-1 \pm \sqrt{25}}{2}$$

$$x = \frac{-1 \pm 5}{2}$$

$$x = \frac{-1 + 5}{2} \qquad\qquad x = \frac{-1 - 5}{2}$$

$$x = \frac{4}{2} = 2 \qquad\qquad x = \frac{-6}{2} = -3$$

$$x = (2, -3)$$

$$x^2 + x - 6 = (x - 2)(x + 3)$$

3. Factorize:

$$4x^2 + 12x + 5 = 0$$

Solution:

Comparing the above equation with the standard form i.e. $ax^2 + bx + c = 0$, we get:

$$a = 4 \quad ; \quad b = 12 \quad ; \quad c = 5$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-12 \pm \sqrt{(12)^2 - 4(4)(5)}}{2(4)}$$

$$x = \frac{-12 \pm \sqrt{144 - 80}}{8}$$

$$x = \frac{-12 \pm \sqrt{64}}{8}$$

$$x = \frac{-12 \pm 8}{8}$$

$$x = \frac{-12 + 8}{8} \qquad\qquad x = \frac{-12 - 8}{8}$$

$$x = \frac{-4}{8} = \frac{-1}{2} \qquad\qquad x = \frac{-20}{8} = \frac{-5}{2}$$

$$x = \left(\frac{-1}{2}, \frac{-5}{2}\right)$$

$$4x^2 + 12x + 5 = \left(x + \frac{1}{2}\right)\left(x + \frac{5}{2}\right)$$

$$4x^2 + 12x + 5 = (2x + 1)(2x + 5)$$

4. Factorize: (PP)

$$10x^2 + x - 2 = 0$$

Solution:

Comparing the above equation with the standard form i.e. $ax^2 + bx + c = 0$, we get:

$$a = 10 \quad ; \quad b = 1 \quad ; \quad c = -2$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-1 \pm \sqrt{(1)^2 - 4(10)(-2)}}{2(10)}$$

$$x = \frac{-1 \pm \sqrt{1 + 80}}{20}$$

$$x = \frac{-1 \pm \sqrt{81}}{20}$$

$$x = \frac{-1 \pm 9}{20}$$

$$x = \frac{-1 + 9}{20} \qquad\qquad x = \frac{-1 - 9}{20}$$

$$x = \frac{8}{20} = \frac{2}{5} \qquad\qquad x = \frac{-10}{20} = \frac{-1}{2}$$

$$x = \left(\frac{2}{5}, \frac{-1}{2}\right)$$

$$10x^2 + x - 2 = \left(x - \frac{2}{5}\right)\left(x + \frac{1}{2}\right)$$

$$10x^2 + x - 2 = (5x - 2)(2x + 1)$$

5. Factorize: (PP)

$$3x^3 - 11x^2 - 42x = 0$$

Solution:

Taking x as common, we get:

$$x(3x^2 - 11x - 42) = 0$$

It means either $x = 0$ or $(3x^2 - 11x - 42) = 0$. So, one factor is "x". Comparing $(3x^2 - 11x - 42) = 0$ with the standard form i.e. $ax^2 + bx + c = 0$, we get:

$$a = 3 \quad ; \quad b = -11 \quad ; \quad c = -42$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-(-11) \pm \sqrt{(-11)^2 - 4(3)(-42)}}{2(3)}$$

$$x = \frac{11 \pm \sqrt{121 + 504}}{6}$$

$$x = \frac{11 \pm \sqrt{625}}{6}$$

$$x = \frac{11 \pm 25}{6}$$

$$x = \frac{11 + 25}{6} \qquad x = \frac{11 - 25}{6}$$

$$x = \frac{36}{6} = 6 \qquad x = \frac{-14}{6} = \frac{-7}{3}$$

$$x = \left(0{,}6, \frac{-7}{3}\right)$$

$$3x^3 - 11x^2 - 42x = x(x - 6)\left(x + \frac{7}{3}\right)$$

$$3x^3 - 11x^2 - 42x = x(x - 6)(3x + 7)$$