

Assignment-2

AI1110: Probability And Random Variables
IIT Hyderabad

Shivanshu Ai21btech11027

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Q7(b) Evaluate the given finite integral.

$$+ \left[\frac{(9) - (-9)}{2} + 3(3) \right]$$

$$\int_{-6}^3 |x+3| dx = \frac{27}{2} - 9 + 0 + 18 \quad (9)$$

Solution:-

$$|x+3| = \begin{cases} (x+3) & \text{if } x+3 \geq 0 \\ -(x+3) & \text{if } x+3 < 0 \end{cases} \quad (1)$$

$$= \frac{27}{2} + 9 \quad (10)$$

$$= \frac{45}{2} \quad (11)$$

$$= 22\frac{1}{2} \quad (12)$$

$$(13)$$

$$|x+3| = \begin{cases} (x+3) & \text{if } x \geq -3 \\ -(x+3) & \text{if } x < -3 \end{cases} \quad (2) \implies \int_{-6}^3 |x+3| dx = 22\frac{1}{2} \text{ unit.}$$

using the property

$$\int_a^b x dx = \int_a^c x dx + \int_c^b x dx$$

$$I = \int_{-6}^3 |x+3| dx \quad (3)$$

$$= \int_{-6}^{-3} |x+3| dx + \int_{-3}^3 |x+3| dx \quad (4)$$

$$= \int_{-6}^{-3} -(x+3) dx + \int_{-3}^3 (x+3) dx \quad (5)$$

$$= - \left[\frac{x^2}{2} + 3x \right]_{-6}^{-3} + \left[\frac{x^2}{2} + 3x \right]_{-3}^3 \quad (6)$$

$$= - \left[\frac{(-3)^2 - (-6)^2}{2} + 3(-3 - (-6)) \right] \quad (7)$$

$$+ \left[\frac{(3)^2 - (-3)^2}{2} + 3(3 - (-6)) \right]$$

$$= - \left[\frac{(9) - (36)}{2} + 3(3) \right] \quad (8)$$