

Section 2-5 : Probability

1. Let,

$$f(x) = \begin{cases} \frac{3}{37760} x^2 (20 - x) & \text{if } 2 \leq x \leq 18 \\ 0 & \text{otherwise} \end{cases}$$

- (a) Show that $f(x)$ is a probability density function.
- (b) Find $P(X \leq 7)$.
- (c) Find $P(X \geq 7)$.
- (d) Find $P(3 \leq X \leq 14)$.
- (e) Determine the mean value of X .

2. For a brand of light bulb the probability density function of the life span of the light bulb is given by the function below, where t is in months.

$$f(t) = \begin{cases} 0.04e^{-\frac{t}{25}} & \text{if } t \geq 0 \\ 0 & \text{if } t < 0 \end{cases}$$

- (a) Verify that $f(t)$ is a probability density function.
- (b) What is the probability that a light bulb will have a life span less than 8 months?
- (c) What is the probability that a light bulb will have a life span more than 20 months?
- (d) What is the probability that a light bulb will have a life span between 14 and 30 months?
- (e) Determine the mean value of the life span of the light bulbs.

3. Determine the value of c for which the function below will be a probability density function.

$$f(x) = \begin{cases} c(8x^3 - x^4) & \text{if } 0 \leq x \leq 8 \\ 0 & \text{otherwise} \end{cases}$$

