

EX(2) If r.v. X have p.d.f. defined as:-

اهتمال التوزيع (48)

$$f(x) = \begin{cases} 3(1-x)^2 & , 0 < x < 1 \\ 0 & , \text{o.w.} \end{cases}$$

Find $E(X)$

Sol

$$E(X) = \int_{-\infty}^{\infty} x \cdot f(x) dx$$

$$= \int_0^1 x \cdot 3(1-x)^2 dx$$

$$= \int_0^1 3x(1-x)^2 dx = \int_0^1 3x(1-2x+x^2) dx$$

$$= \int_0^1 (3x - 6x^2 + 3x^3) dx$$

$$= \left[\frac{3x^2}{2} - \frac{6x^3}{3} + \frac{3x^4}{4} \right]_0^1$$

$$= \frac{3}{2} - \frac{6}{3} + \frac{3}{4} = \frac{36 - 48 + 18}{24} = 0.25$$

(12) (8) (6)

$$\frac{3}{2} + \frac{3}{4} - 2 = \frac{12+6}{8} - 2 = \frac{18}{8} - 2 = \frac{9}{4} - \frac{8}{4} = \frac{1}{4}$$

(4) (2)

Properties of Expectation

امتحان رقم (49)

① $E(c) = c$, c is a constant

2) $E(cx) = c E(x)$, c is a constant

3) $E(x \pm y) = E(x) \pm E(y)$ where x and y are two r.v.

Sol IF X is D.r.v.

① $E(c) = \sum_{\forall x} c p(x)$

$$= c \sum_{\forall x} p(x) = c \cdot 1 = c$$

IF X is C.r.v.

$$E(c) = \int_{\forall x} c \cdot f(x) dx = c \int_{\forall x} f(x) dx = c \cdot 1 = c$$

2) $E(cx) = \sum_{\forall x} cx p(x)$

$$= c \sum_{\forall x} x p(x)$$

$$= c E(x)$$

$$E(cx) = \int_{\forall x} cx f(x) dx$$

$$= c \int_{\forall x} x f(x) dx$$

$$= c E(x)$$

3) H.w.