Instituto Federal de Goiás

Disciplina: Probabilidade e Estatítica

Professor: Chiago Vedovatto

Aluna: Daniella do Amaral

Semana 15

01. Considere a FDP:

$$f(x) = \begin{cases} x/2, & \text{se } 0 < x \leq 1; \\ 3 - x/4, & \text{se } 1 < x \leq 2; \\ 1/4, & \text{se } 2 < x \leq 3; \\ 0, & \text{caso contrário.} \end{cases}$$

Determine:

a) $E(X)$

$$E(X) = \int_0^3 x\, f(x)\, dx$$

$$= \int_0^1 x \cdot \frac{x}{2}\, dx + \int_1^2 x \cdot \left(3 - \frac{x}{4}\right) dx + \int_2^3 x \cdot \frac{1}{4}\, dx$$

$$= \left[\frac{x^3}{6}\right]_0^1 + \left[\frac{3x^2}{2} - \frac{x^3}{12}\right]_1^2 + \left[\frac{x^2}{8}\right]_2^3$$

$$= \frac{1^3}{6} + \left[\frac{3 \cdot 2^2}{2} - \frac{2^3}{12} - \frac{3 \cdot 1^2}{2} + \frac{1^3}{12}\right] + \left[\frac{3^2}{8} - \frac{2^2}{8}\right]$$

$$= \frac{1}{6} + \frac{9}{2} - \frac{7}{12} + \frac{5}{8} = \frac{113}{24} \cong 4,708.$$

spiral

b.) $E(x^2)$

$$E(x^2) = \int_0^3 x^2 f(x)\, dx$$

$$= \int_0^1 x^2 \cdot \frac{x}{2}\, dx + \int_1^2 x^2 \cdot \left(3 - \frac{x}{4}\right) dx + \int_2^3 x^2 \cdot \frac{1}{4}\, dx$$

$$= \left[\frac{x^4}{8}\right]_0^1 + \left[x^3 - \frac{x^4}{16}\right]_1^2 + \left[\frac{x^3}{12}\right]_2^3$$

$$= \frac{1^4}{8} + \left[\frac{2^3}{} - \frac{2^4}{16} - 1^3 + \frac{1^4}{16}\right] + \left[\frac{3^3}{12} - \frac{2^3}{12}\right]$$

$$= \frac{1}{8} + 6 + \frac{1}{16} + \frac{19}{12} = \frac{373}{48} \cong 7,771.$$