

Matricula: A01571214

Fecha: 08/08/2024

2. La variable continua: Unos problemillas

Esemplo 1

$$\int_{-\infty}^{\infty} f(x) dx = 1$$

$$\int_0^2 cx^2 dx = 1$$

$$\int_0^2 c x^2 dx = c \int_0^2 x^2 dx = c \left[\frac{x^3}{3} \right]_0^2 = c \left(\frac{2^3}{3} - \frac{6^3}{3} \right) = C \cdot \frac{8}{3} = \frac{8}{3} c$$

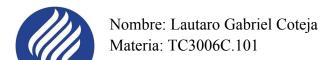
$$\frac{3}{8c} = 1$$

$$C = \frac{3}{8}$$

$$P(O < X \le I) = \int_{0}^{I} f(x) dx = \int_{0}^{I} \frac{3}{8} x^{2} dx$$

$$\int_0^1 \frac{3}{8} x^2 dx = \frac{3}{8} \left[\frac{x^3}{3} \right]_0^1 = \frac{3}{8} \cdot \frac{1}{3} = \frac{3}{24} = \frac{1}{8}$$

$$P(0 < x \leq 1) = \frac{1}{8}$$



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Ejemplo 2

$$\int_{-\infty}^{\infty} F(x) \, dx = 1$$

$$\int_{1}^{\infty} \frac{k}{x^{4}} \, dx = 1$$

$$\int_{1}^{\infty} \frac{k}{x^{\frac{1}{4}}} dx = k \int_{1}^{\infty} x^{-\frac{1}{4}} dx$$

$$k\left[\frac{x^{-3}}{-3}\right]_{1}^{\infty} = k\left[0-\left(-\frac{1}{3}\right)\right] = \frac{k}{3}$$

$$\frac{k}{3}=1$$
 \implies $k=3$

$$E(x) = 2\left[\frac{x_{-5}}{x}\right]_{\infty}^{1} = 3\left[0 - \left(-\frac{1}{5}\right)\right] = \frac{3}{3}$$

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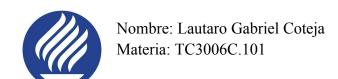
$$\frac{\int_{1}^{\infty} x^{2} \int_{1}^{\infty} x^{2} \int_{1}^{\infty} x^{2} \int_{1}^{\infty} x^{2} \cdot \frac{3}{x^{4}} dx = 3 \int_{1}^{\infty} x^{-2} dx}{3 \int_{1}^{\infty} x^{-1} \int_{1}^{\infty} x^{2} \cdot \frac{3}{x^{4}} dx = 3 \int_{1}^{\infty} x^{-2} dx}$$

$$V_{\alpha 1}(x) = E(x^{2}) - (E(x))^{2} = 3 - (\frac{3}{2})^{2} = 3 - \frac{9}{4} = \frac{12}{4} - \frac{9}{4} = \frac{3}{4}$$

$$P(X > 2) = \int_{\infty}^{3} \frac{x^{3}}{3} dx = 3 \left[\frac{x^{-3}}{-3} \right]_{\infty}^{2} = \frac{8}{1}$$

$$P(x \le 2) = 1 - P(x > 2) = 1 - \frac{1}{8} = \frac{7}{8}$$

$$P(X \leq x) = 1 - \int_{x}^{\infty} \frac{3}{x^{1}} dx = 1 - \frac{1}{x^{3}}$$



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