

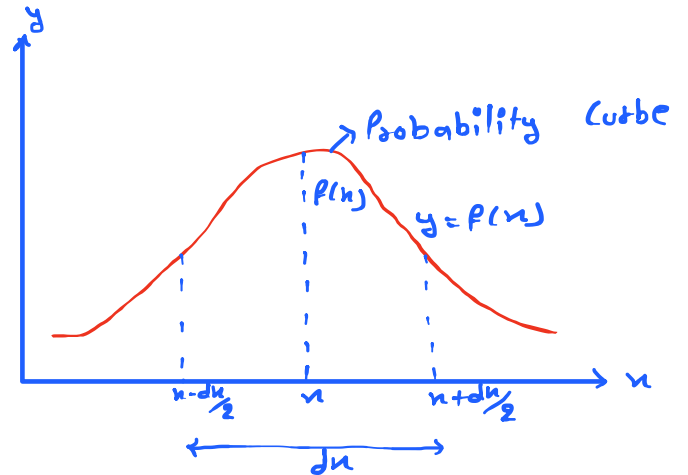
Probability Density Function

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Let the probability that the continuous random variable X lie with the interval $(x - \frac{dx}{2}, x + \frac{dx}{2})$

$$P(x - \frac{dx}{2} \leq x \leq x + \frac{dx}{2}) = f(x) dx$$

$$P(a \leq x \leq b) = \int_a^b f(x) dx$$



$$E_x \rightarrow \begin{cases} ax & 0 \leq x \leq 1 \\ a & 1 \leq x \leq 2 \\ -ax + 3a & 2 \leq x \leq 3 \\ 0 & \text{otherwise} \end{cases}$$

$$f(x) = \int_{-\infty}^0 f(x) dx + \int_0^1 f(x) dx + \int_1^2 f(x) dx + \int_2^3 f(x) dx + \int_3^{\infty} f(x) dx = 1$$

$$= 0 + \int_0^1 ax dx + \int_1^2 a dx + \int_2^3 [-ax + 3a] dx + 0 = 1$$

$$= \frac{3a}{2} + \frac{3a}{2} - 4a = 0$$

$$a = \frac{1}{2}$$