

Handout for random variables and population parameters

Try: For a discrete random variable X :

$$\mu = E[X] = \sum x p(x)$$
$$\sigma^2 = E[(X - \mu)^2] = \sum_x (x - \mu)^2 p(x)$$

where the summation is over all possible values for X .

Suppose $P(X = -1) = 0.25$, $P(X = 0) = 0.50$ and $P(X = 1) = 0.25$

Calculate μ , σ^2 and σ for X .

Try: If X is a random number between 0 and 1, then it is a continuous random variable that can take on any value in the interval with equal likelihood, that is, its probability density function is constant over the interval. Because the area under a pdf curve must be 1, its pdf is given by

$$f(x) = \begin{cases} 1, & \text{if } 0 \leq x \leq 1 \\ 0, & \text{otherwise} \end{cases}$$

a) Find $P(X \leq 0.25)$ (Hint: try sketching the pdf and remember that probabilities are areas under the curve).

b) Find an expression for $F(x) = P(X \leq x)$ as a function of x .

c) Find the 75th percentile of the distribution of X , i.e., find the value q such that $P(X \leq q) = 0.75$.