

Assignment No.1

STA-642

MC200200839

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Q.No.1:

Solution:

(a)

Cumulative Distribution Function

Let X be a random variable then its cumulative distribution function (**CDF**) is defined by $F_x(X)$ is given as

$$F_x(x) = P_x((-\infty, x]) = P(\{c \in C : X(c) \leq x\})$$

it can also be written as

$$P(\{c \in C : X(c) \leq x\}) \text{ to } P(X \leq x)$$

Also $F_x(x)$ is often called simply the distribution function (**df**).

The graph of the discrete case it is like a staircase, which is also called a step function.

On the other hand, in the continuous case it is continuous curve or a line.

Pascal, binomial, and hyper geometric distributions are all part of discrete distribution which are used to describe variation of attributes.

Lognormal distribution is a continuous distribution used to describe variation of the continuous variables.

Q.No.1 (b)

Monotonically increasing: A monotonically increasing function is one that increase as x does for real x .

$$f(x) = 2x + 3$$

$$f(x) = \log(x)$$

$$f(x) = e^x$$

are examples of increasing functions.

Monotonically decreasing function: A monotonically decreasing function, on the other hand, is one that decreases as x increases for all real x . In particular, these concepts are helpful when studying exponential and logarithmic functions.

Examples:

$$f(x) = -x^5$$

$$f(x) = e^{-x}$$

are the examples of decreasing function.

Q.No.2

Solution:

There are two conditions through which we can verify it.

$$1. \quad f(x) \geq 0 \text{ for all } 0 \leq x \leq 2$$

Yes this condition satisfies.

$$2. \quad \int_{-\infty}^{\infty} f(x) dx = 1$$

$$f(x) = \frac{1}{4}x^3 \quad \text{where } 0 \leq x \leq 2$$

$$\int_0^2 \frac{1}{4}x^3 dx$$

$$\left[\frac{1}{16}x^4 \right]_0^2$$

$$\left[\frac{1}{16}(2)^4 - \frac{1}{16}(0)^2 \right] = \frac{16}{16} - 0$$

$$\frac{16}{16} = 1$$

Yes this condition also satisfies.

Hence it is proved that it has valid probability density Function (PDF).