

AI1103 - Assignment 4

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Download latex codes from

https://github.com/vishwahurakadli/AI1103/tree/main/Assignment_4

So the correct option is (4)

1) CSIR-UGC-NET(mathA june 2015) Q.110 :

Suppose X has density

$$f(x|\theta) = \frac{1}{\theta} e^{-\frac{x}{\theta}}, x > 0, \theta > 0 \quad (0.0.1)$$

Define Y as follows

$$Y = k \text{ if } k \leq X < k + 1, k = 0, 1, 2, \dots \quad (0.0.2)$$

Then the distribution of Y is

- 1.normal
- 2.binomial
- 3.poisson
- 4.geometric

2) Solution

given that x has density f then

$$PDF(x) = \frac{e^{-x/\theta}}{\theta} \quad (0.0.3)$$

therefore Q will be

$$Q_X(\alpha) = \int_{\alpha}^{\infty} \frac{e^{-x/\theta}}{\theta} \quad (0.0.4)$$

$$Q_X(\alpha) = e^{-\alpha/\theta} \quad (0.0.5)$$

Now

$$Y = k, \text{ if } k \leq X < k + 1 \quad (0.0.6)$$

so considering Q

$$\Pr(Y = K) = \Pr(k \leq X < k + 1) \quad (0.0.7)$$

$$= Q_X(k) - Q_X(k + 1) \quad (0.0.8)$$

$$= e^{-k/\theta} - e^{-(K+1)/\theta} \quad (0.0.9)$$

$$= a * e^{-k} \text{ where } a \text{ is constant} \quad (0.0.10)$$

geometric distribution is given by

$$\Pr(X = K) = (1 - p)^{k-1} p \quad (0.0.11)$$

therefore obtained y distribution is geometric