

AI1103 Assignment 4

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Download all python codes from

https://github.com/Sandeep-L/AI1103_4/blob/main/Assignment_4_AI1103.py

and latex-tikz codes from

https://github.com/Sandeep-L/AI1103_4/blob/main/Assignment_4_AI1103.tex

110 QUESTION

Suppose X has density $f(x|\theta) = \frac{1}{\theta}e^{-x/\theta}$, $x > 0$ where $\theta > 0$ is unknown. Define Y as follows:

$Y = k$ if $k \leq X < k + 1$, $k = 0, 1, 2, \dots$

Then the distribution Y is

- | | |
|-------------|--------------|
| 1) Normal | 3) Poisson |
| 2) Binomial | 4) Geometric |

SOLUTION

The C.D.F of X is given by

$$F_X(x) = \int_0^x \frac{1}{\theta} e^{-w/\theta} dw \quad (0.0.1)$$

$$F_X(x) = \left[-e^{-w/\theta} \right]_0^x \quad (0.0.2)$$

$$F_X(x) = 1 - e^{-x/\theta} \quad (0.0.3)$$

Relation between x and Y for $k = 0, 1, 2, \dots$ is given by

$$Y = k \quad k \leq X < k + 1 \quad (0.0.4)$$

Let the C.D.F of Y be denoted by $F_Y(y)$

$$F_Y(y) = P(Y \leq y) \quad (0.0.5)$$

$$= P((X + 1) \leq y) \quad (0.0.6)$$

$$= P(X \leq (y - 1)) \quad (0.0.7)$$

$$= F_X(y - 1) \quad (0.0.8)$$

$$F_Y(y) = 1 - e^{-(y-1)/\theta} \quad (0.0.9)$$

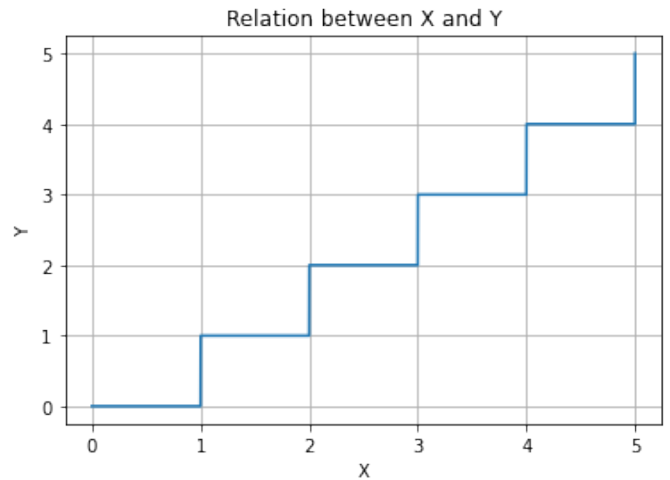


Fig. 4: Relation between X and Y