

# AI1103-Assignment 4

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Python codes :

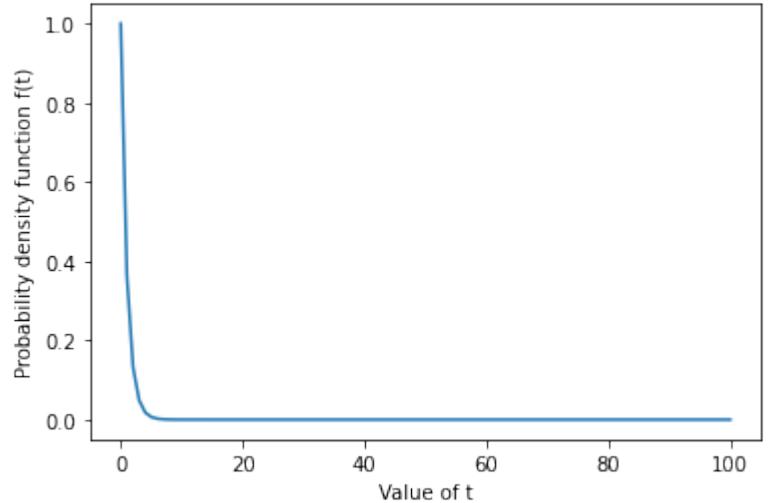
```
https://github.com/Aayush-2492/Assignments/tree/
main/Assignment4/code
```

Latex codes :

```
https://github.com/Aayush-2492/Assignments/tree/
main/Assignment4
```

Therefore the required probability depends on  $b - a$   
Option (A) is correct.

Plot for probability density function.



## QUESTION 29

A discrete random variable  $X$  takes values from 1 to 5 with probabilities as shown in the table. A student calculates the mean of  $X$  as 3.5 and her teacher calculates the variance of  $X$  as 1.5. Which of the following statements is true? Let  $X$  be a random variable with probability density function:

$$f(t) = \begin{cases} e^{-t} & t \geq 0 \\ 0 & t < 0 \end{cases}$$

Let  $b > a > 0$ . Then the probability  $P(X \leq b | X \geq a)$

- A)  $b-a$
- B)  $a$
- C)  $b$
- D)  $a+b$

## SOLUTION

$$P(X \leq b | X \geq a) = \frac{P((X \leq b) \cdot (X \geq a))}{P(X \geq a)} \quad (0.0.1)$$

$$= \frac{P(a \leq X \leq b)}{P(X \geq a)} \quad (0.0.2)$$

$$= \frac{\int_a^b e^{-t} dt}{\int_a^\infty e^{-t} dt} \quad (0.0.3)$$

$$= \frac{-e^{-t} \Big|_a^b}{-e^{-t} \Big|_a^\infty} \quad (0.0.4)$$

$$= \frac{e^{-a} - e^{-b}}{e^{-a}} \quad (0.0.5)$$

$$= 1 - e^{-(b-a)} \quad (0.0.6)$$