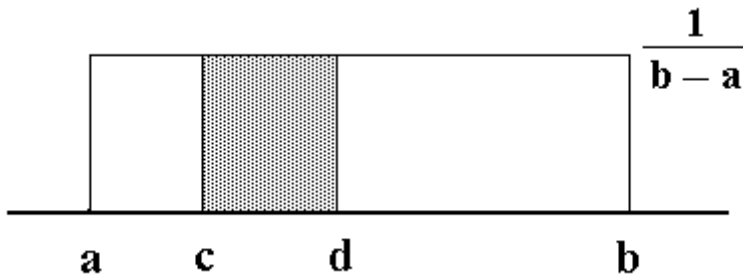


Uniform Distribution over an interval $[a, b]$:



For Uniform distribution,

$$P(c \leq X \leq d) = \frac{d-c}{b-a}, \quad a \leq c \leq d \leq b.$$

$$E(X) = \frac{a+b}{2}, \quad \text{Var}(X) = \frac{(b-a)^2}{12}.$$

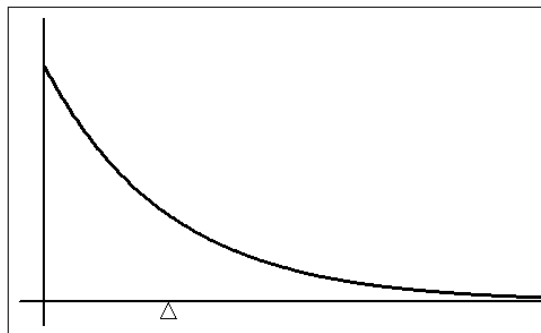
Exponential Distribution:

$$f(x) = \begin{cases} \frac{1}{\theta} e^{-x/\theta} & \text{for } x \geq 0 \\ 0 & \text{otherwise} \end{cases}$$

$$f(x) = \begin{cases} \lambda e^{-\lambda x} & \text{for } x \geq 0 \\ 0 & \text{otherwise} \end{cases}$$

$$E(X) = \theta,$$

$$\text{Var}(X) = \theta^2.$$



$$E(X) = 1/\lambda,$$

$$\text{Var}(X) = 1/\lambda^2.$$

Example 1:

Suppose the lifetime of a particular brand of light bulbs is exponentially distributed with mean of 400 hours.

a) Find the probability that a randomly selected light bulb would last over 500 hours.

b) Find the probability that 3 out of 7 randomly selected light bulbs would last over 500 hours.

c) Find the probability that a randomly selected light bulb would last between 300 hours and 800 hours.