Uniform Distribution over an interval [ $\mathrm{a}, \mathrm{b}$ ]:


For Uniform distribution,

$$
\begin{array}{ll}
P(c \leq X \leq d)=\frac{d-c}{b-a}, & a \leq c \leq d \leq b . \\
E(X)=\frac{a+b}{2}, & \operatorname{Var}(X)=\frac{(b-a)^{2}}{12} .
\end{array}
$$

## Exponential Distribution:

$f(x)=\left\{\begin{array}{cc}\frac{1}{\theta} e^{-x / \theta} & \text { for } x \geq 0 \\ 0 & \text { otherwise }\end{array} \quad f(x)=\left\{\begin{array}{cc}\lambda e^{-\lambda x} & \text { for } x \geq 0 \\ 0 & \text { otherwise }\end{array}\right.\right.$
$E(X)=\theta$,
$\operatorname{Var}(X)=\theta^{2}$.


$$
\begin{aligned}
& E(X)=1 / \lambda \\
& \operatorname{Var}(X)=1 / \lambda^{2 .}
\end{aligned}
$$

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.
