3-100 a) Let $X$ denote the number of calls in one hour. Then, $X$ is a Poisson random variable with $\lambda = 10$.

$$P(X = 5) = \frac{e^{-10}10^5}{5!} = 0.0378.$$  

b) $P(X \leq 3) = e^{-10} + \frac{e^{-10}10}{1!} + \frac{e^{-10}10^2}{2!} + \frac{e^{-10}10^3}{3!} = 0.0103$

c) Let $Y$ denote the number of calls in two hours. Then, $Y$ is a Poisson random variable with $\lambda = 20$. $P(Y = 15) = \frac{e^{-20}20^{15}}{15!} = 0.0516$

d) Let $W$ denote the number of calls in 30 minutes. Then $W$ is a Poisson random variable with $\lambda = 5$. $P(W = 5) = \frac{e^{-5}5^5}{5!} = 0.1755$

3-104 a.) $E(X) = \lambda = 0.1$ failures per 100 samples. Let $Y$= the number of failures per day

$$E(Y) = E(5X) = 5E(X) = 5\lambda = 0.5$$ failures per day.

b.) Let $W$= the number of failures in 500 participants, now $\lambda = 0.5$ and $P(W = 0) = e^{-0.5} = 0.6065$

3-106 a) Let $X$ denote the failures in 8 hours. Then, $X$ has a Poisson distribution with $\lambda = 0.16$.

$$P(X = 0) = e^{-0.16} = 0.8521$$

b) Let $Y$ denote the number of failure in 24 hours. Then, $Y$ has a Poisson distribution with $\lambda = 0.48$. $P(Y \geq 1) = 1 - P(Y = 0) = 1 - e^{-0.48} = 0.83812$