



Student Name in Arabic:

Section:

B.N.

Answer the following questions

1- Find the probability of getting between 3 and 6 heads inclusive in 10 tosses of a fair coin

$$n = 10, p = q = 0.5, p(3 < x < 6) = \sum_{x=4}^5 {}^{10}C_x (0.5)^x (0.5)^{10-x}$$

2- A family has three children. Find the probability of having two boy, given that at most one of the children are girls

$A = \{ \text{having two boy} \} = \{BGB, BBG, GBB\}$, $B = \{BBB, GBB, BGB, BBG\}$,
therefore $P(A/B) = 3/4$

3- Let X be a random variable with gamma distribution with alpha = 2, beta = 1/5.
Find the probability $P(X > 30)$, $E(X)$ and $\text{Var}(X)$

$$P(X > 30) = \frac{1}{25} \int_{30}^{\infty} x e^{-x/5} dx, \text{ put } y = x-30, \text{ therefore}$$

$$P(X > 30) = \frac{1}{25} \int_0^{\infty} (y+30) e^{-(y+30)/5} dy = \frac{e^{-6}}{25} \int_0^{\infty} y e^{-y/5} dy + \frac{6e^{-6}}{5} \int_0^{\infty} e^{-y/5} dy$$

Put $y/5 = z \Rightarrow dz = dy/5$, therefore

$$P(X > 30) = e^{-6} \int_0^{\infty} z e^{-z} dz + 6e^{-6} \int_0^{\infty} e^{-z} dz = 7e^{-6}$$

$$E(X) = \frac{1}{\lambda} = 10, \text{Var}(X) = 50$$

Good Luck

Dr. eng. Khaled El Naggar