Benha University Engineering Mathematics and Physics Department 1st semester 2012-2013



Faculty of Engineering (Shoubra) Electrical Engineering (power) Mathematics 3A – Code: EMP 271 Mid term exam (13 marks) Section: B.N.

Student Name in Arabic:

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 = { 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 Var(X)

 $P(X > 30) = \frac{1}{25} \int_{30}^{\infty} x e^{-x/5} dx$, put y = x-30, 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 $y/5 = z \implies dz = dy/5$, 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) = / = 10, Var(X) = 50

Good Luck

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