| Benha University <br> Engineering Mathematics and <br> Physics Department <br> $1^{\text {st }}$ semester 2012-2013 | Faculty of Engineering (Shoubra) <br> Electrical Engineering (power) <br> Mathematics 3A - Code: EMP 271 <br> Mid term exam (13 marks) |
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| Student Name in Arabic: | Section: |
| AnSWer the following questions |  |

1- Find the probability of getting between 3 and 6 heads inclusive in 10 tosses of a fair coin
$\mathrm{n}=10, \mathrm{p}=\mathrm{q}=0.5, \mathrm{p}(3<\mathrm{x}<6)=\sum_{\mathrm{x}=4}^{5} 10 \mathrm{c}_{\mathrm{x}}(0.5)^{\mathrm{x}}(0.5)^{10-\mathrm{x}}$
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 $\}=\{B G B, B B G, G B B\}, B=\{B B B, G B B, B G B, B B G\}$, therefore $\mathrm{P}(\mathrm{A} / \mathrm{B})=3 / 4$

3- Let X be a random variable with gamma distribution with alpha $=2$, beta $=1 / 5$. Find the probability $\mathrm{P}(\mathrm{X}>30), \mathrm{E}(\mathrm{X})$ and $\operatorname{Var}(\mathrm{X})$
$P(X>30)=\frac{1}{25} \int_{30}^{\infty} x e^{-x / 5} d x$, put $y=x-30$, therefore
$P(X>30)=\frac{1}{25} \int_{0}^{\infty}(y+30) e^{-(y+30) / 5} d y=\frac{\mathrm{e}^{-6}}{25} \int_{0}^{\infty} y e^{-y / 5} d y+\frac{6 \mathrm{e}^{-6}}{5} \int_{0}^{\infty} \mathrm{e}^{-\mathrm{y} / 5} d y$

Put $y / 5=z \Rightarrow d z=d y / 5$, therefore

$$
\begin{aligned}
& \qquad P(X>30)=e^{-6} \int_{0}^{\infty} z e^{-z} d z+6 e^{-6} \int_{0}^{\infty} e^{-z} d z=7 e^{-6} \\
& E(X)=\alpha / \beta=10, \operatorname{Var}(X)=50 \\
& \text { Good Luck } \\
& \text { Dr. eng. Khaled El Naggar }
\end{aligned}
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