**King Fahd University of Petroleum & Minerals**

**Serial #**

- 1 points for not writing your serial number

Electrical Engineering Department

EE315: Probabilistic Methods in Electrical Engineering (112)

**Quiz 3: Random Variables**

Name: **Key**

An intercom system master station provides audio to 4 hospital rooms. The probability that any one room will be switched on and draw power at any time is 0.25. When on, a room draws 0.2 W.

a) Find and plot the density and distribution functions for the random variable “power delivered by the master station”.

$$P\left(X=0\right)=\left(\begin{matrix}4\\0\end{matrix}\right)\left(0.25\right)^{0}\left(0.75\right)^{4}=0.3164$$

$$P\left(X=0.2\right)=\left(\begin{matrix}4\\1\end{matrix}\right)\left(0.25\right)^{1}\left(0.75\right)^{3}=0.422$$

$$P\left(X=0.4\right)=\left(\begin{matrix}4\\2\end{matrix}\right)\left(0.25\right)^{2}\left(0.75\right)^{2}=0.211$$

$$P\left(X=0.6\right)=\left(\begin{matrix}4\\3\end{matrix}\right)\left(0.25\right)^{3}\left(0.75\right)^{1}=0.0469$$

$$P\left(X=0.8\right)=\left(\begin{matrix}4\\4\end{matrix}\right)\left(0.25\right)^{4}\left(0.75\right)^{0}=0.0039$$

For CDF

0.3164 0.7383 0.9492 0.9961 1.0000

% Dr. Ali Muqaibel

clear all

close all

% EE315 112 HW 3

N=4;

P=0.25;

x=[0 0.2 0.4 0.6 0.8 ]

x1=0:4;

y=binopdf(x1,N,P)

y1=cdf('bino',x1,N,P)

figure (1)

stem(x,y)

xlabel('Power delivered by the Master Station')

ylabel ('pdf')

axis ([-.1 0.9 0 0.6])

figure (2)

stairs(x,y1)

xlabel('Power delivered by the Master Station')

ylabel ('CDF')

axis ([0 0.8 0 1.2])

b) If the master-station amplifier is overloaded when more than 0.5W is demanded what is the probability of overload?

$$P\left(X=0.6\right)+P\left(X=0.8\right)=0.0469+0.0039=0.0508$$

Also equals to $1- 0.9492 =0.0508 $

 Good Luck, **Dr. Ali Muqaibel**