EE342 Exam 1
February 28, 2007
Closed Book, Justify all work

Good Luck

NAME_____________________

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1) (24) Parts a), b), and c) are all independent of each other.

a) Let $A$ and $B$ be events. If $P(A) = 2P(B) = .6$ and the probability that neither event occurs is .25 find $P(AB)$ and $P(A|B)$.

b) A data packet contains 10000 bits. The packet is transmitted through a noisy channel where the probability of a bit error is $2 \times 10^{-5}$. The packet can correct up to two bit errors. If the packet has three or more bit errors, the packet is corrupted. Find the probability that the packet is corrupted.
c) Let $Y$ be a random variable with $p_Y(k) = 0.125$ for $k = -1, 2$ and $p_Y(k) = 0.375$ for $k = 0, 1$. Write down matlab commands to simulate 1000 samples drawn from this random variable.
2) (16) UH is playing Boise State in a football game. Colt, the UH quarterback injures his leg in a practice session. There is a probability of .4 that he will not be able to play. There is a probability of .3 that Colt’s injured leg will be completely healed and he will play against Boise State. There is also a probability of .3 that his injured leg will be partially healed and he will be able to play against Boise State with limited mobility. If Colt does not play UH has a probability of .2 of winning the game. If Colt plays with a partially healed leg UH has a probability of .4 of winning the game and if Colt plays with a fully healed leg UH has a probability of .6 of winning the game.

a) Find the probability that UH wins the game.

b) If UH wins the game what is the probability that Colt did not play.
3) (30)

a) An urn contains four blue balls and two red balls. Balls are drawn at random without replacement until the first red ball is drawn. Let $X$ be the random variable describing the total number of balls drawn. Find the pmf and mean of $X$.

b) An urn contains four blue balls and two red balls. Balls are drawn at random without replacement until both red balls are drawn. Let $Y$ be the random variable describing the total number of balls that are drawn. Find the pmf and mean of $Y$. 
4) (30) Let $X$ have the following moment generating function:

$$M_X(t) = (1/16)e^{-t}(e^{2t} + 1)^4$$

a) Find the pmf of $X$, $E(X)$, and $VAR(X)$.

b) Find the pmf of $Y = X^2$. 