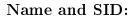
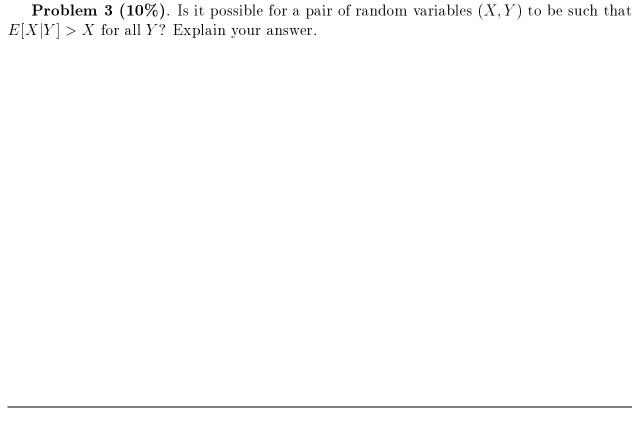
Department of EECS - University of California at Berkeley EECS126 - Probability and Random Processes - Spring 2003 Midterm No. 2: 4/08/2003



There are seven problems. Answer on these sheets. Show your work. Good luck.

Problem 1 (10%). Give an example of a pair of random variables (X,Y) that are uncorrelated and not independent.

Problem 2 (10%). Give an example of a pair of random variables (X,Y) that are not independent and are such that E[X|Y] = E(X).



Problem 5 (15%). Let X,Y,Z be independent and equally likely to take the values $\{-2,-1,0,1,2\}$. Calculate L[X+2Y|X+Y,Y+Z].

Problem 6 (25%). Let X, Z be independent with P(X=0)=0.4, P(X=1)=0.6, and Z=N(0,1). Find the MLE and the MAP of X given Y=X+(1+X)Z.

Problem 7 (30%). For x = 0, 1, given X = x, Y is exponentially distributed with mean $\mu(x)$, for x = 0, 1 where $0 < \mu(0) < \mu(1)$.

- a. Find $\hat{X} = g(Y)$ that maximizes $P[\hat{X} = 1 | X = 1]$ subject to $P[\hat{X} = 1 | X = 0] \leq 5\%$. b. Assume that $\mu(0) = 1$. Find the minimum value of $\mu(1)$ so that $P[\hat{X} = 1 | X = 1] \geq 1$ 95%.