Department of EECS - University of California at Berkeley
EECS126 - Probability and Random Processes - Spring 2000
Midterm No. 1: 2/23/2000

Name and SID:

Answer the questions on these four sheets. Show your work. Good luck.

Problem 1: (25%) You flip a fair coin repeatedly. What is the probability that you have to flip it exactly 10 times to see two "heads"?

Problem 2: (25%) Let A, B, C be three events. Assume that $P(A) = 0.6, P(B) = 0.6, P(C) = 0.7, P(A \cap B) = 0.3, P(A \cap C) = 0.4, P(B \cap C) = 0.4, P(A \cup B \cup C) = 1$. Find $P(A \cap B \cap C)$.

Problem 3: (25%) There are two coins. The first coin is fair. The second coin is such that $P(H) = 0.6 = 1 - P(T)$. You are given one of the two coins, with equal probabilities between the two coins. You flip the coin four times and three of the four outcomes are H. What is the probability that your coin is the fair one?

Problem 4: (25%) Define the random variable X as follows. You throw a dart uniformly in a circle with radius 5. The random variable X is equal to 2 minus the distance between the dart and the center of the circle if this distance is less than or equal to one. Otherwise, X is equal to 0.

a. Plot carefully the probability distribution function $F(x) = P(X \leq x)$ for $x \in \Re := (-\infty, +\infty)$.

b. Give the mathematical expression for the probability density function $f(x)$ of X for $x \in \Re := (-\infty, +\infty)$.