MAT 2377 3X (Spring 2011)

Assignment 3
Deadline : Thursday, June 30 in class.

Note : You must give complete details in your solutions. To receive points for the question, you must clearly justify your final answer.

Please answer the following 2 questions.

1. The compressive strength of samples of cement can be modeled by a normal distribution with a mean of 6050 kilograms per square centimeter and a standard deviation of 110 kilograms per square centimeter.
   (a) What is the probability that the sample strength is less than 6200 $\mathsf{kg/cm}^2$?
   (b) What is the probability that a sample's strength is between 5800 and 6000 $\mathsf{kg/cm}^2$?
   (c) What strength x_0 (in $\mathsf{kg/cm}^2$) is exceeded by 95% of the samples ? (Note : In other words, 95% of the samples have a strength that is larger than x_0.)
   (d) What strength x_1 (in $\mathsf{kg/cm}^2$) is exceeded by 10% of the samples ?

2. Hits to a high volume Web site can be modeled as a Poisson process with a rate of $10,000$ hits per day.
   (a) Let X be the number of hits in 5 days. Give the distribution of X.
   (b) Consider the random variable X from part 2a. Approximate the following probability : $P(X < 49{,}500)$.
   (c) Let T be the time in days to observe 100,000 hits. Give the distribution of T.
   (d) Compute the mean and the standard deviation of the random variable T from part 2c.
   (e) What is the probability that we will have to wait more than 30 seconds to observed 3 hits ?