Math 403 Fall 2009

Homework 8

Due Wednesday, October 21

WMMY: Ch 5 # 53, 59, 70, 71, 73, 77
Ch 6 # 47, 49, 53

Problem A: For each variable, choose an appropriate distribution to model it: Normal, Binomial, Exponential, Geometric, Poisson, Uniform.

a. The number of lightning strikes on the St. Louis Gateway Arch during a thunderstorm.
b. The time from birth that a caterpillar leaves it's cocoon as a butterfly.
c. The number of spins on a slot machine until you win the jackpot.
d. The time a person arriving at a metrolink station must wait for their train.
e. The number of passengers boarding the 9:13am Eastbound metrolink train at Grand Station.
f. The number of baseball players on a major league roster who chew tobacco.
g. The number of false alarms that Brinks security systems recieves in an hour.
h. The actual size of a ball bearing specified to have a 1mm diameter.
i. The number of giardia parasites in a sample of 1cc of water.
j. The time between successive clicks of a Geiger counter.

Problem B: Let X have the exponential distribution $f(x)=\frac{1}{\beta}e^{-x/\beta}$. Check that f is a probability distribution function, and compute the mean and standard deviation of X.

Problem C: Establish the "memoryless" property of the Poisson process, by showing that the time to an event T (which follows the exponential distribution) does not depend on the initial time of the process.

That is, prove that the conditional probability $P(T \geq t + t_0 \mid T \geq t_0)$ is equal to $P(T \geq t)$ for any value of t_0. Hint: Use the definition of conditional probability, Def 2.9.