1. The mean rate at which buses arrive at a certain stop is 5 buses per hour. Assume the bus arrivals follow a Poisson Process. If you arrive at 8:00am,

(a). Determine the probability distribution for the time until the next bus arrives.

(b). Find the probability that you will wait until at least 8:10am.

(c). Find the probability that you will wait until at least 8:20am.

(d). If Alice arrives at 8:05am, find the probability (from Alice's perspective) that she will wait at least until 8:15am. (She does not know how long you have been waiting.)

(e). If Alice asks you how long you have been waiting, find the probability (from Alice's perspective) that she will have to wait at least until 8:15am.

Note from parts (d) and (e), the probability was ___independent of when the clock started___ .

This fact illustrates the ___"No Memory"___ Property of the Exponential Distribution.

i.e.

The current waiting time until the next occurrence is independent of the ___time elapsed since the last occurrence.___

$P(X > a + b | X > a) =$ ___$P(X > b)$___

2. Find the median waiting time for a random variable X with an exponential distribution.

Find the median waiting time for the bus example.

3. The number of days that elapse between the beginning of a calendar year and the moment a high-risk driver is involved in an accident is exponentially distributed. An insurance company expects that 30% of high-risk drivers will be involved in an accident during the first 50 days of the calendar year. What portion of high-risk drivers is expected to be involved in an accident during the first 100 days?

Homework Section 3.2, p. 109: #1, 2, 3, 6