CEE 5390 - Modeling and Simulation in CEE

Homework 3

Arguments derived from probabilities are idle
~ Plato

January 31, 2008

Question 1

Show that the following relationship generally holds true for any queue when it is in steady state:

$$W = W_q + \frac{1}{\mu} \tag{1}$$

Where all the symbols have their usual meanings.

Question 2

Derive the Poisson process by using the assumption that the number of arrivals in non-overlapping intervals are statistically independent and then applying the binomial distribution. *[Hint: Consider the following approximation:*

$$[1 - \frac{\lambda}{n}]^n \simeq e^{\lambda} \tag{2}$$

for very large values of n and moderate values of λ.]

Question 3

You are given two Poisson processes with intensities λ_1 and λ_2. Find the probability that there is an occurrence of the first stream before the second, starting at time $t = 0$. *[Hint: Use the memoryless property].*