

(HW Queue 2 is a continuation of HW Queue 1, you may want to review HW Queue 1)

1. Bank of America in Harrisonburg in Harrisonburg has a single drive-in teller window. Customers arrive at the window about every 10 minutes on average according to a Poisson process or the hourly arrival rate is  $\lambda = 6$ . It take an average of five minutes (exponentially distributed) to complete each customer order or the hourly service rate is  $\mu = 12$ .
  - l. What percentage of the time are the employees busy at the window?
  - m. What is the average number of customers waiting to be served?
  - n. What is the average number of customers at the window?
  - o. What is the average amount of time spent in line by customers at the window?
  - p. What is the probability that a customer will have to wait in line to get served at the window?
  - q. How long, on average, does it take a customer to get served at the window?
  - r. What is the probability there are three customers at the window?
  - s. What is the probability there are more than three customers waiting to order?

s-1: assume BoA pays \$15 per hour for each server, and the cost of customers' waiting to be served is \$0.25 per minute. What is the hourly average cost for BoA to operate M/M/1 window as given above?

- t. Suppose that business increases by 50% in Friday afternoon, (You may use Q.xls to get the answer for some of the variables, but be sure to provide adequate explanations)
- i. Can one window handle the increased volume? Support your answer.

ii. How are customers' average waiting times affected?

iii. What is the total hourly operating cost for BoA if one window is open?

iv. What is the total hourly operating cost for BoA if two windows are open?

v. Would you recommend BoA to open three windows for the situation? Why and Why not?