HW Queue 1 (Waiting Line) Model and Applications Name: _____

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. It take an average of five minutes (exponentially distributed) to complete each customer order.

1. What is the average arrival rate per hour to the window at Bank of America?

2. What is the probability distribution of the number of arrivals to Bank of America?

3. What are the chances that no customers arrive in a 20-minutes period?
   a. What is the arrival rate per 20-minutes?

   b. What is the equation with the notation and the answer for the problem?

   c. What is the Excel@ formula to be used to get the same solution? (Please test it out first)

4. What is the probability of 5 customers arriving to the window in a 20-minutes period?
   a. What is the equation with the notation and the answer for the problem?

   b. What is the Excel@ formula to be used to get the same solution? (Please test it out first)

5. What is the probability of more than 4 customers arriving to the window in a 20-minute period?
   a. What is the equation with the notation and the answer for the problem?

   b. What is the Excel@ formula to be used to get the same solution? (Please test it out first)

6. What is the average service rate per hour for serving a customer at the window?

7. What is the probability density function and cumulative distribution function for service times?

8. What percentage of the orders will be prepared in exactly 4 minutes?

9. What percentage of customer orders will take less than five minutes to prepare?
    a. What is the equation with the notation and the answer for the problem?

    b. What is the Excel@ formula to be used to get the same solution? (Please test it out first)

10. What are the chances it will take more than 5 minutes to serve a customer at the window?
    a. What is the equation with the notation and the answer for the problem?

    b. What is the Excel@ formula to be used to get the same solution? (Please test it out first)

11. What are the chances it will take between 3 and 5 minutes to serve a customer at the window?
    a. What is the equation with the notation and the answer for the problem?

    b. What is the Excel@ formula to be used to get the same solution? (Please test it out first)

12. Knowing =POISSON(x, mean, cumulative) and given =1 - POISSON(4, 2, TRUE) in Excel@ to return a value of 0.0527. Briefly explain how to interpret this value.