***This questions form Operation Research Management , I need all the steps of your solution so that I can understand …..***

***This is copy of the book which you can find the question if you need***

<http://www.scribd.com/doc/26139573/Chapter-20-Queuing-Theory>

Q1) During the year 2000, there was an average of .022 car accident per person in the United States. Using your knowledge of the Poisson random variable, explain the truthin the statement, “Most drivers are better than average.”

Q2) My home uses two light bulbs. On average, a light bulb lasts for 22 days (exponentially distributed). When a light bulb burns out, it takes an average of 2 days (exponentially distributed) before I replace the bulb.  
a) Formulate a three-state birth–death model of this situation.  
b) Determine the fraction of the time that both light bulbs are working.  
c) Determine the fraction of the time that no light bulbs are working.

Q3) The decision sciences department is trying to determine whether to rent a slow or fast copier. the department believes an employees time is worth $15/hour. The slow copier rents for $4 per hour and it takes an average of 10minutes to complete copying. The fast copier rents for $15 per hour and takes an average of 6 minutes to complete copying. On average, 4 employees per hour need to use the copying machine. Which machine should the department rent to minimize expected total cost per hour? Assume the copying times and interarrival times to the copying machine are exponentially distributed.

Q4) Assume that an average of 125 packets per second of information arrive to a router and that it takes an average of .002 second to process each packet. Assuming exponential interarrival and service times, answer the following questions

A) What is the average number of packets waiting for entry into the router?

B) What is the probability that 10 or more packets are present?