#1 Please do problem #17.6-9 (same in 7th and 8th editions) in your textbook.

#2 Problem #17.6-11 (same in 7th and 8th editions) in your textbook.

#3 George is planning to open a drive-through photo developing booth with a single service window that will be open approximately 200 hours per month in a busy commercial area. Space for a drive-through lane is available for a rental of $200 per month per car length. George needs to decide how many car lengths of space to provide for his customers.

Excluding this rental cost for the drive-through lane, George believes that he will average a profit of $4 per customer served (nothing for a drop off of film and $8 when the photos are picked up.) He also estimates that customers will arrive randomly (a Poisson process) at a mean rate of 20 per hour, although those who find the drive through lane will be forced to leave. Half of the customers who find the drive-through lane full wanted to drop off film, while the other half wanted to pick up their photos. The half who wanted to drop off film will take their business elsewhere. The other half of the customers who find the drive-through lane full will not be lost because they will keep trying later until they pick up their photos. George assumes that the time required to service a customer will follow an Exponential distribution with a mean of 2 minutes.

(a) Find $L$ and the mean rate at which customers are lost when the number of car lengths provided is 2, 3, 4, and 5.

(b) Calculate $W$ from $L$ for the cases considered in part (a).

(c) Use the results of part (a) to calculate the decrease in the mean rate at which customers are lost when the number of car lengths of space provided is increased from 2 to 3, from 3 to 4, and from 4 to 5. Then calculate the increase in expected profit per hour (excluding space rental costs) for each of these three cases.

(d) Compare the increases in expected profit found in part (c) with the cost per hour of renting each car space. What conclusion do you draw about the number of car lengths of space that George should provide?

#4 Please do problem #17.6-32 in 8th edition (#17.6-34 7th edition) in your textbook.