Problem 11-59

If the mean arrival rate is four trucks per hour, and the mean service rate is eight trucks per hour. Using the following excel spreadsheet:

Single Server Queueing Model	
Enter the data only in the yellow cells.	
Lambda	10
Mu	12
Probability system is empty	0.167
Average number waiting for service in the queue	4.167
Average number in system (queue and in service)	5.000
Average time waiting for service (time in queue)	0.417
Average waiting time in system (waiting time plus service time)	0.500
Probability arrival has to wait	0.833
n =	3
Probability of n units in the system (queue and in service)	0.096

Inputting the mean arrival rate as λ, and the mean service rate as μ, we get the following observations:

Lambda	4
Mu	8
Probability system is empty	0.500
Average number waiting for service in the queue	0.500
Average number in system (queue and in service)	1.000
Average time waiting for service (time in queue)	0.125
Average waiting time in system (waiting time plus service time)	0.250
Probability arrival has to wait	0.500
n =	2
Probability of n units in the system (queue and in service)	0.125

for part (a), we can see that the probability that the truck dock will be idle (Probability system is empty) is 0.5.

For part (b), we can see that the average number waiting for service in the queue is 0.500.

for part (c) we can see that the average number in system (queue and service) is 1.000. Thus, the average number of trucks in the system is 1.000.

For part (d) we can see that average time waiting for service (time in queue) is 0.125.

For part (e) we can see that the average waiting time in the system is 0.250.

For part (f) we can see that the probability that an arrival has to wait is 0.500.

For part (g) we can see that if $n = 2$, then the probability that more than two trucks are waiting for service is .125.