The counter of a bank branch performs the transactions with a mean time of 2 minutes. The customers arrive at a mean rate of 20 customers/hour. If we assume that arrivals follow a Poisson process and that the service time is exponential, determine:

a) Percentage of the time the bank teller is idle
b) Mean waiting time of the customers
c) Percentage of customers that wait in a queue

A grocery shop is attended by one person. Apparently, the arrival pattern of customers during Saturdays follows a Poisson process with an arrival rate of 10 persons/hour. Customers are attended following a FIFO order and, due to the prestige of the shop, once they arrive, they are willing to wait for the service. The service time is distributed exponentially, with a mean time of 4 minutes. Determine

a) Probability of waiting in line
b) Average length of the waiting line
c) Average waiting time

Customers arrive at a hair salon with a mean rate of 5 customers/hour and inter-arrival times distributed exponentially. There is always one hairstylist present in the salon at any moment and there are 4 chairs for the customers that arrive when the hairstylist is busy. The law regarding fire prevention limits the total number of customers in the salon, at any moment, to a maximum of 5. Customers that arrive when the salon is full can't enter in it. Service time is distributed exponentially with a mean that depends on the number of customers. Determine:

a) Average number of waiting customers
b) Average waiting time
c) Percentage of time that the hairstylist is idle

Number of customers in the salon	1	2	3	4	5
Mean service time per customer (min.)	9	10	10	13	20

A bank branch has two office employees equally efficient and capable of attending 60 operations/hour on average, with the true time distributed exponentially. Customers arrive at the bank branch following a Poisson process with a mean rate of 100 customers/hour. Determine:

a) Probability of strictly more than 3 customers simultaneously in the bank branch
b) Probability that at least one of the employees will be idle

A self-service car wash has four sections. In each one, the customers can wash and wax their cars. There is only space for a maximum of three additional cars when the washing sections are full. Customers arrive at the service following a Poisson process with a mean rate of 15 cars/hour. If there is no room for waiting, cars must leave the service. Apparently, the time required to service a car is distributed exponentially with a mean of 12 minutes. Determine:

a) Average number of cars in the service at any moment
b) Average number of cars per hour that are rejected because the service is full