***Question 1.People arrive at a cinema ticket booth in a poisson distributed arrival rate of 25per hour. Service rate is exponentially distributed with an average time of 2 per min.***

***Calculate the mean number in the waiting line, the mean waiting time , the mean number in the system , the mean time in the system and the utilization factor?***

***Solution:***

***Arrival rate λ=25/hr***

***Service rate µ= 2/min=30/hr***

***Length of Queue (Lq)= λ 2/ µ(µ- λ)***

 ***= 252/(30(30-25))***

 ***=4.17 persone***

 ***Expected Waiting Time In Quie (Wq) = λ / µ(µ- λ)***

 ***=25/(30(30-25))***

 ***=1/6 hr= 10 min***

***Expected Waiting Time In The System (Ws) = 1/ (µ- λ)***

 ***=1/(30-25)***

 ***=1/5hr= 12 min***

***Utilization Ratio = λ /µ***

 ***=25/30***

 ***=0.8334 = 83.34%***

***Question 2. Assume that at a bank teller window the customer arrives at a average rate of 20 per hour according to poission distribution .Assume also that the bank teller spends an distributed customers who arrive from an infinite population are served on a first come first services basis and there is no limit to possible queue length.***

***1.what is the value of utilization factor?***

***2.What is the expected waiting time in the system per customer?***

***3.what is the probability of zero customer in the system?***

***Solution:***

***Arrival rate λ=20 customer per hour***

***Service rate µ= 30 customer per hour***

***1.Utilization Ratio = λ /µ***

 ***= 20/30 = 2/3***

 ***2. Expected Waiting Time In The System (Ws) = 1/ (µ- λ)***

 ***=1/(30-20)***

 ***=1/10 hour = 6 min***

***3. Probability of zero customers in the system P0 = 1 – P***

 ***=1- 2/3 = 1/3***