

Question 1

Given an ARQ with transmission error $p=0.01$, and a transmission delay of 10 ms with an ideal ACK/NACK performance:

- A.) What type of distribution is represented by this?
- B.) How many transmissions are required for a packet with a length of 10 bits to be correctly transmitted?

Question 2

For dice rolled 60 times, there is a null hypothesis regarding whether or not its distribution is uniform. The results for each number rolled are as follows: 1-8 times, 2-13 times, 3-12 times, 4-6 times, 5-7 times and 6-14 times. Perform a Chi-Squared Test to determine if it should be accepted.

Question 3

Construct a queue based on a fast food restaurant of your choice.

- A.) Draw a block diagram of the system.
- B.) What are the attributes in this system?
- C.) Explain what type of queue it is.

Question 4

A manager at a fast food restaurant currently uses an M/G/1 queue with an average service time of $\mu=2$ with a standard deviation of $\sigma=0.5$.

- A.) What service type would allow for a decrease in the queue length while still maintaining a rate of $\mu=2$ for each server?
- B.) Assuming the queue length of this improved model was $L_Q=10.6$, what would the new average customer time (λ) be?

Question 5

Complete the table for a bank teller simulation starting at time $T=0$ with an arrival, given that some previously generated random variables for inter-arrival times are **1, 4, 5, 1**, and for departure times are **2, 1, 4, 2**. (no need to use all the values) The state of the system is characterized by (number of packets in line, busy/idle for server). Busy state for the server is marked as "1". The events in FEL are denoted as (type of event, time). For arrival events, type =1, for departure events, type =2.

| Clock | Arrival Time | Departure Time | System State | FEL |
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