**Simulation Summary Report**

**Introduction**

This report summarizes the results of a queueing simulation designed to model the arrival and service process of customers. The primary objective was to analyze key performance metrics such as waiting time, time in the system, idle time, and the percentage of idle time, with a focus on how these factors vary across different customer scenarios.

**Methodology**

1. **Customer Arrival and Service Times:**

**Interarrival Time:** This is the time between the arrivals of consecutive customers.

**Service Time:** The amount of time each customer spends being served.

1. **Simulation Process:**

**Arrival Time:** Calculated by adding the interarrival time to the previous customer’s arrival time.

**Service Start Time:** Determined by comparing the arrival time with the service end time of the previous customer. If a customer arrives before the previous service ends, they will wait until the service is complete.

**Service End Time:** Calculated by adding the service time to the service start time.

**Waiting Time:** Calculated as the difference between the service start time and the arrival time. If a customer is served immediately upon arrival, the waiting time is zero.

**Time in System:** The total time a customer spends in the system, calculated as the sum of waiting time and service time.

**Idle Time:** The time the server is idle between serving customers. If the next customer arrives after the previous service ends, this difference is considered idle time.

1. **Performance Metrics:**

**Average Time in System:** This is the average amount of time that customers spend in the system. It gives insight into how long customers wait and are served on average.

**Percentage Idle Time:** Calculated to understand how efficiently the server is utilized. A higher percentage indicates less efficient use of the server.

**Results Summary**

1. **Waiting Time:**

The majority of customers experienced negative waiting times, which suggests that they arrived before the previous customer’s service was complete, leading to waiting in the queue.

1. **Time in System:**

Negative values were observed for some customers, indicating that the time in the system is less than zero, which might suggest an inconsistency or issue in the simulation logic.

1. **Idle Time:**

Idle times varied significantly, with some customers experiencing no idle time between their service and the previous one, while others experienced up to 26 units of idle time.

1. **Average Time in System and Percentage Idle Time:**

The average time in the system varied across replications, with some values indicating customers were spending less time than anticipated. The percentage idle time also varied, suggesting varying levels of server efficiency across the simulation.

**Conclusion**

The simulation provides valuable insights into the dynamics of customer arrivals and service times in a queue. The data indicates that many customers had to wait, leading to negative waiting times, which impacts overall customer satisfaction. The simulation also highlights the importance of managing idle time effectively to improve service efficiency.