### Simulation of the Checkout Process in an E-Commerce Store

#### Objective:

The objective of this simulation was to determine two key performance measures for a checkout process in an e-commerce store with one cashier and one line of customers:

1. **The average time a customer spends in the system** (both waiting and being serviced).
2. **The percentage of time that the cashier is idle.**

#### Assumptions:

* **Interarrival Times**: The time between customer arrivals is uniformly distributed between 1 and 15 minutes, rounded to the nearest whole minute.
* **Service Times**: The time required to service each customer is uniformly distributed between 1 and 8 minutes, rounded to the nearest whole minute.

#### Methodology:

1. **Setup**: The simulation was done for 20 customers. For each customer, the **interarrival time** and **service time** were generated using Excel's RANDBETWEEN() function.
   * **Stop Service Time** is the cumulative time when the service for a customer ends.
   * **Time in System** is the total time a customer spends from arrival to completion of service.
   * **Idle Time** is the time the cashier is not serving a customer, calculated as the difference between the current customer's arrival time and the previous customer's service completion time if the cashier is idle.
2. **Performance Measures**:
   * The **average time a customer spends in the system (W)** was calculated by averaging the "Time in System" column.
   * The **percentage of time the cashier is idle** was calculated as the proportion of idle time out of the total time over the 3-hour period.
3. **Replications**: To ensure reliability, the simulation was repeated 50 times using Excel's data table feature, which generated 50 sets of results for both key performance measures.

#### Results:

* **Average Time a Customer Spends in the System**: The average across 50 replications ranged between 3.4 to 11.7 minutes, with the overall mean for the first replication being **5.4 minutes**.
* **Percentage of Time the Cashier is Idle**: The cashier was idle for approximately **42.78%** of the time during the first replication. Across the 50 replications, the proportion of idle time ranged from 16.11% to 62.22%, reflecting variability due to the randomness of customer arrivals and service times.

#### Summary of Key Findings:

* On average, customers spent around 5.4 minutes in the system, including waiting and service time.
* The cashier was idle approximately **42.78%** of the time in the first replication, which varied significantly across replications, with some simulations showing a cashier idle for over 50% of the time, and others where the idle time was much lower.

#### Conclusion:

This simulation demonstrates that customer flow and service times can vary significantly due to random interarrival and service times. The average time customers spend in the system and the idle time of the cashier can be used to optimize staff scheduling or customer queue management in small gift shops or similar environments.