Step-by-Step Guide of how I arrived at my results while simulating in excel

**1. Set Up Your Spreadsheet**

**Step-by-Step Process**

**1. Data Setup**

1. **Opened MS Excel:**
   * I opened MS Excel and created a new spreadsheet to record and analyze the checkout process data.
2. **Labeled Columns:**
   * I labeled the columns as follows:
     + A: Customer ID
     + B: Interarrival Time
     + C: Arrival Time
     + D: Service Time
     + E: Service Start Time
     + F: Service End Time
     + G: Waiting Time
     + H: Time in System
     + I: Idle Time

**2. Input Random Data**

1. **Customer ID:**
   * I entered sequential numbers from 1 to 20 in Column A (e.g., A2: 1, A3: 2, …, A21: 20).
2. **Interarrival Time:**
   * I generated random interarrival times using the formula =RANDBETWEEN(1, 15) in Column B. This simulated the time between customer arrivals.
3. **Service Time:**
   * I generated random service times using the formula =RANDBETWEEN(1, 8) in Column D. This represented how long each customer was serviced.

**3. Calculate Times**

1. **Arrival Time:**
   * For the first customer (cell C2), I set the arrival time to 0.
   * For subsequent customers, I used the formula =C(previous) + B(current) to calculate the arrival time. Here, C(previous) was the previous customer’s arrival time, and B(current) was the current customer’s interarrival time.
2. **Service Start Time:**
   * For the first customer, I set the service start time to the arrival time: =C2.
   * For subsequent customers, I used the formula =MAX(C(current), F(previous)) to determine the service start time. Here, C(current) was the current customer’s arrival time, and F(previous) was the previous customer’s service end time.
3. **Service End Time:**
   * I calculated the service end time with the formula =E(current) + D(current), where E(current) was the service start time, and D(current) was the service time.
4. **Waiting Time:**
   * I computed the waiting time using the formula =E(current) - C(current).
5. **Time in System:**
   * I determined the time in the system with the formula =F(current) - C(current).
6. **Idle Time:**
   * For the first customer, I set the idle time to 0.
   * For subsequent customers, I calculated the idle time using the formula =E(current) - F(previous), ensuring no negative values (i.e., =MAX(0, E(current) - F(previous))).

**4. Analyze Results**

1. **Average Time in System:**
   * I calculated the average time in the system by averaging all values in the “Time in System” column using the formula =AVERAGE(H2:H21).
2. **Percentage of Idle Time:**
   * I summed all values in the “Idle Time” column using the formula =SUM(I2:I21).
   * I determined the total simulation time by calculating the difference between the last customer’s service end time and the first customer’s arrival time: =F(last) - C(first).
   * I computed the percentage of idle time with the formula = (SUM(I2:I21) / (F(last) - C(first))) \* 100.

**5. Review and Interpret Results**

1. **Compared Average Time in System:**
   * I reviewed the computed average to assess if it met performance expectations or if there were areas for improvement.
2. **Assessed Idle Time Percentage:**
   * I analyzed the clerk’s idle time percentage to understand how often the clerk was not occupied with customers and considered adjustments to improve efficiency.

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