Simulation steps using Simulation Table

- Determine the characteristics of each of the inputs to the simulation (probability distributions).
- Construct a simulation table (repetition 1).
- For each repetition $i$, generate a value for the inputs, and evaluate function, calculating a value of response $y_i$. 
## Simulation table

<table>
<thead>
<tr>
<th>Repetitions</th>
<th>$x_{i1}$</th>
<th>$x_{i2}$</th>
<th>...</th>
<th>...</th>
<th>$y_i$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>...</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Simulation of Queuing System (Details in chapter 6)

- **Finite/Infinite**
- **Dis. arrival Rate**
- **FIFO/RR/...**
- **Priority**
- **Finite/Infinite**
- **Dis. Service Numbers**
- **Calling population**
- **Waiting line**
- **Server**
Single-Server Simulation

What are the events?

Service completion event

Departure event

Begin server idle time | No | Another unit waiting? | Yes | Remove the waiting unit from the queue |
\|--|--|--|--|--|
\| Begin servicing the unit |
Example 2.1: Grocery Center

- One checkout counter
- Arrival time between customers are 1 to 8 minutes (equal probability)
- Service time vary from 1 to 6 (service time table)
- We are going to analysis for 100 customers.
Outputs

- Average waiting time = $174/100 = 1.74$ minutes
- The probability that a customer has to wait = $0.46$
- The proportion of idle time of the server = $101/418 = 0.24$
- Average service time = $317/100 = 3.17$

![Frequency of Waiting Time in Queue](image)
Random Normal Numbers
Results of 400 Trials

Simulation of Inventory Systems

- N: Length of periodic review that inventory level is checked
- An order is made to bring the inventory to the level M
- Lead Time: the length of time between the placement and receipt of an order (here is zero)
- Q: order quantity
Question

- How can we compute the $\pi$ value?