Examples of Process Simulation

- Queuing systems
- Logistics systems
- Call centers
- Computer networks
- Manufacturing systems
- Health care systems
- Production scheduling
- Conveyor systems
- Inventory management

Basic steps in using process simulation

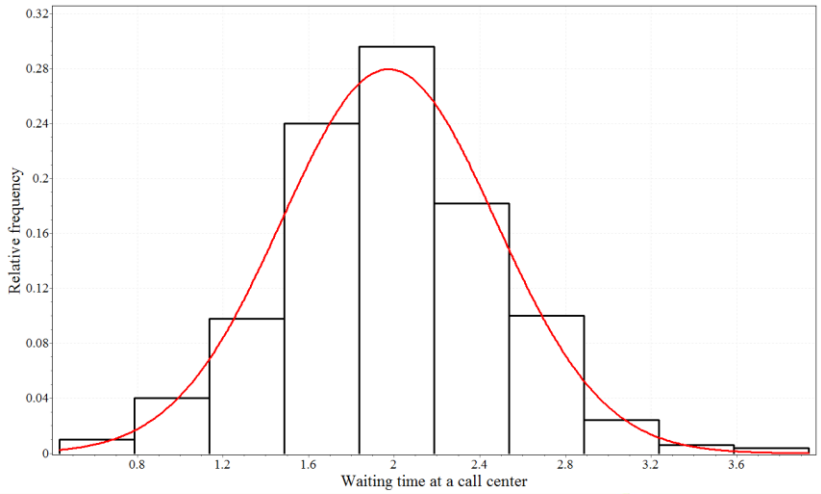
1. Draw a *process flow map* of the process.
2. Obtain *data*.
3. Input the model and data (typically in the form of *statistical distributions*) into computer.
4. Check that the computer simulation behaves like the real process (*validation*).
5. Perform *experiments* with the computer simulation by varying the values of variables of interest.
6. Analyze the results; look for combinations of the values of the variables that give the best performance.

Process Simulation – Waiting Lines

(SimQuick Chap 2)

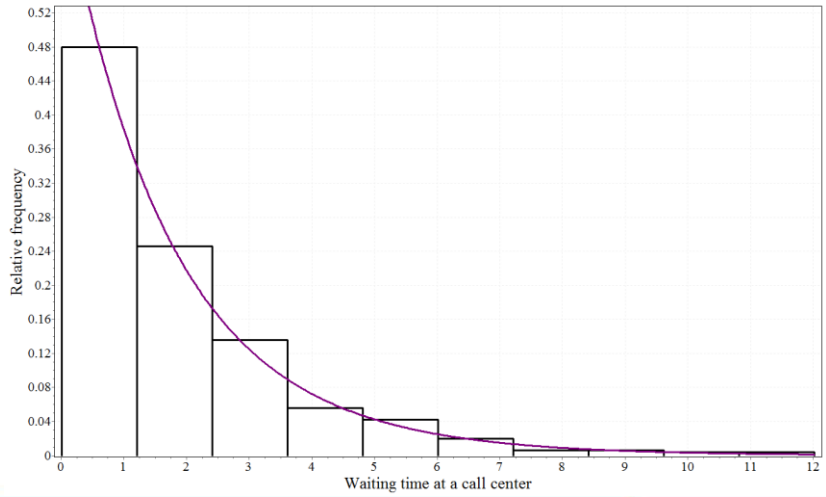
Review of Common Statistical Distributions

- Normal Distribution: Nor(m,s) in SimQuick



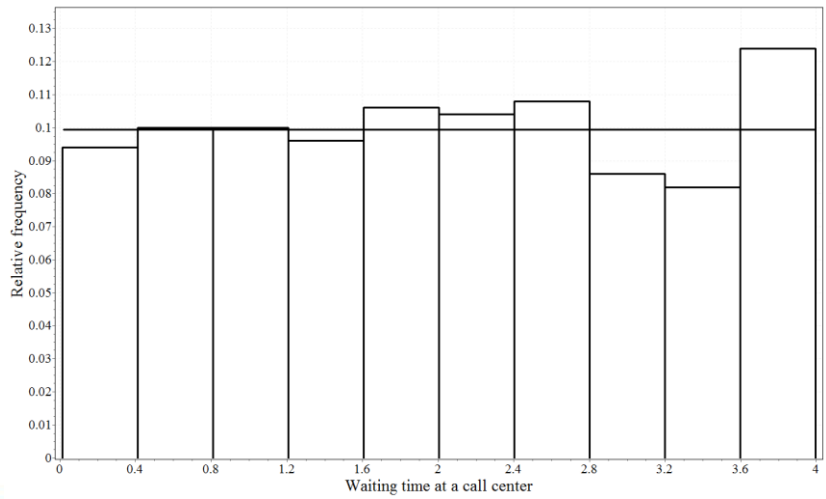
Review of Common Statistical Distributions

- Exponential Distribution: Exp(m) in SimQuick



Review of Common Statistical Distributions

- Uniform Distribution: Uni(a,b) in SimQuick



Example: A bank

- Consider the following process within a small bank: customers enter the bank, get into a single line, are served by a teller, and finally leave the bank. Currently, this bank has one teller working from 9am to 11am.
- Management is concerned that the wait in line seems to be too long. Therefore, they are considering two process improvement ideas:
  - Option 1: installing a new *automated check-reading machine* that can help the single teller serve customers more quickly
  - Option 2: adding an *additional teller* during these hours
- What should management do?

Example: A bank

- Process flow map:

- Five Elements in SimQuick
  - Entrances, Exits, Work Stations, Buffers, Decision Points

Example: A bank

- Question: What data to collect?
  - How long to serve a customer
  - How much time between customer arrivals
  - Capacity of line

Example: A bank

Some details based on data from the current process:

- We have observed that the amount of time between arrivals of customers can be approximated by an exponential distribution with a mean of 2 minutes.
- The line in this bank can only hold 8 people and if a person arrives when the line is full he/she does not get in line.
- We have observed that the service time by the teller can be approximated by a normal distribution with a mean of 2.4 minutes and a standard deviation of .5 minutes.