Name:_____

Hints for Homework #4 Data Structures
Bank Simulation

To determine the transaction time per customer and whether a car arrives via based on a probability, you can use the rand( ) function as follows:

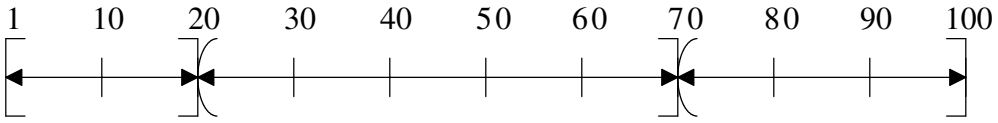
- The transaction time can vary as:

  20% of the customers take 2 minutes
  50% of the customers take 4 minutes
  30% of the customers take 7 minutes

Since there are 100% total, I'd generate a random integer from 1 to 100 like:

```
number = rand( ) % 100 + 1
```

You can then use an if-statement to determine the number of minutes by splitting up the range as:



1 to 20
2 minutes

21 to 70
4 minutes

71 to 100
7 minutes

- For the arrival probability, I'd do something similar. Generate a random integer from 1 to 10 like:

```
number = rand( ) % 10 + 1
```

If the arrival probability is 0.6, I'd check to see if the random number was from 6 to 1. If it is, a car arrives in that simulated minute; otherwise no car arrived.

- Careful consideration of the looping structure for the program is driven by the fact that you want 6 tables printed (1-Teller SIMULATION, 2-Teller SIMULATION, ... , 6-Teller SIMULATION) so the number of tellers is probably the "outer-most" loop.

  For each table, you need to print a whole row (all 120 minute simulations) before moving on to the next row (all 240 minute simulations), etc. Thus, the next loop should be for the simulation durations.

    For each row of a table, you'll finally need to vary the arrival probabilities.

      Run the simulation

    End For each arrival prob.

  End For simulation duration

End #-Teller simulation

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- For each “minute” during the simulation, you’ll want to pick some order to perform these (and maybe more) things:
    - check each teller to see if the front car has completed, if so increment the number of customers serviced and move the car out
    - check to see if a new car arrives at the “unlimited-car line” according to the arrival probability for the current simulation, if so add the car to the queue with the current wall clock time stamp
    - check if a teller is free and there is a car in their line, if so determine this car’s wait-time (difference between the current wall clock and the time stamp received upon entering the queue), and its transaction duration (2, 4, or 7 minutes)
    - check to see if car(s) could move from the unlimited-car line to the teller line(s)
- At the end of the simulation duration, sum the size of the queues to determine the number of cars waiting at the end of the simulation.