Project   – Elevator
CECS 622
Spring 2020 Semester

Data, Conditions and Assumptions:

1. An office building has 4 floors (G, 2, 3, 4) and 1 elevator.
2. The elevator has a capacity of 12 people.
3. On average, six workers arrive per minute between 8:00 am and 9:00 am. (Inter-arrival rate is exponential with mean = 0.1667).
4. Workers are equally likely to be going to 2nd, 3rd, or 4th floor. p(2) = p(3) = p(4) = 1/3.
5. Travel time of the elevator from floor to floor (in minutes) is as follows

	G	2	3	4
G	-	1.00	1.5	1.75
2	1.00	-	.50	.75
3	1.50	.50	-	.50
4	1.75	.50	.25	-

6. The elevator only stops at a given floor if someone is getting off at that floor.
7. When the elevator stops at a floor, the door remains open for .5 minutes, regardless of how many passengers are getting on or off.
8. If there are more than 12 people waiting on the elevator, some people will use the stairs. A person going to the second floor will have a .50 chance of walking. A person going to the third floor will have a .33 chance of walking. A person going to the fourth floor will have a .10 chance of walking.
9. The effect of workers riding the elevator DOWN during this time period is trivial and can be disregarded.

Project:

Develop a computer simulation of this project and run it many times.

Collect simulation output data to determine the distribution of the following metrics:
1. The average wait time for a worker
2. The average number of people that walk to the 2nd, 3rd, 4th floors on a given day
3. The time that the last worker boards the elevator each day
4. The average number of workers in line at 8:30, 8:45, and 9:00 each da

Deliverables and Grading Rubric:

- Report
    - Results summary (50 points total)
        - (30 points) Summarize the above the metrics in graphical form.
        - (10 points) Interpret your results from the standpoint of a worker in the building.
        - (10 points) Interpret your results from the standpoint of the owner of the building.
    - Implementation summary (20 points total)
        - (5 points) describe the language/platform/tools you used in this project and why you chose these instead of another alternative.
        - (5 points) Describe the data structures that you used to represent the elements in this problem
        - (5 points) Discuss how many times you ran this simulation and how you decided that this was an adequate number.
        - (5 points)Include a screen shot of your program.
    - Critical thinking summary (30 points total)
        - (10 points) What was the most difficult part of this project?
        - (10 points) If you did this project again, what would you do differently to improve it?
        - (10 points) What specifically did you learn from this project and how do you think it might help you in your future academic or industrial career?

Note: This project requires you to design and develop a computer program and show its results as part of your report. Attempts to develop analytical models are only acceptable for validation but not as the main requirement.

Acknowledgment : This project is adapted from an idea provided by Dr. C.T. Hardin who was my former doctoral student.