**Registration Simulation**

For this project, I built a simulator to represent the registration at a convention so that we may accurately predict the necessary resources required to allocate for the convention. The studies formed were based on the arrival of one-thousand guests using Poisson’s distribution to gather an accurate estimate on the amount of people that could possibly show up for the event. The requirements for a successful registration included the registrants having to spend on average four and a half minutes registering and no less than one and a half minutes registering. In addition, registrants had to wait in a line that was no longer than five people deep between the times of eight in the morning and six in the afternoon which added up to ten hours total. In order to best predict the total windows required for this convention, I determined the arrival of the registrants using an approximately uniform distribution and generated the completion of the registration based on a negative exponential distribution using a random number generator for the best unbiased results. In short, my findings suggest that for the best result it would be wise to hire seven registrant windows to never see a line become longer than five people.

This best result was determined based on the various trials that I ran using the registration simulator. Overall, I ran five different trials five times each. These trials included four, five, six, seven, and eight total window counts. I began with a total of four windows because it wasn’t unreasonably small or large for the expected amount of registrants. This trial gave a baseline for the queue time and the line length. After running the trials for the window count of four, I found that the average line length was 9.0 people including the registrant. This was too many people in the line to meet the requirement of a line no longer than five people, so I increased the number of windows by one for the next trial. When I completed the trial with five windows, I found that the average line length was 6.4 people including the registrant. This was closer to the line length requirement, but it was still too many people in the line. Therefore, I again increased the number of windows by one for the next trial. When I completed the trial with six windows, I found that the average line length was 5.2 people including the registrant. This average met the line length requirement, but there was a scenario where the longest line length was six people which means it doesn’t always meet the line length requirement. Due to this, I increased the amount of windows by one for the next trial. When I completed the trial with seven windows, I found that the average line length was 4.4 people including the registrant which met the line length requirement. Since this number was close to the boundary, I wanted to run a trial with eight windows. When I completed the trial with eight windows, I found that the average line length was 4.0 people including the registrant which definitely met the line length requirement. Although some of these trials had similar line lengths, some lines had significantly longer queue time than the others.

In conclusion, the most efficient and cost effective amount of windows to have open at the event is seven windows. This amount of open windows had the most reliable results when it came to line length. You could have eight windows to ensure the lines never hit a length of five, but this would cost a larger and unnecessary amount of money. Opening six windows could be a cost cutting solution for this event, but there would be no guarantee that the line lengths would always be less than five people. Based on this information, I would suggest opening seven windows at the event.