Simulation – Assignment 3

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1.) Do any of the observed values differ significantly between 3p5r and 4p5r or between 3p5r and 3p4r when treated as independent experiments and samples?

Queue Length:

- For configuration (3, 4) with queue length CI (0.06, 0.15) and (3, 5) with CI (0.00, 0.11), there is some overlap, indicating no significant difference when treated independently.
- Comparing (3, 5) with CI (0.00, 0.11) and (4, 5) with CI (-0.00, 0.01), the overlap is very minimal, suggesting a potential difference though it might be marginally significant.

Utilization:

- Overlapping CIs for utilization between configurations (3, 4) [0.82, 0.96] and (3, 5) [0.85, 0.99] imply no significant differences.
- Similarly for (3, 5) [0.85, 0.99] versus (4, 5) [0.89, 0.99], the overlap suggests no statistically significant difference.

Blocking Probability:

- Blocking probability is zero across configurations, indicating no observed incidents of recovery room blocking, leading to no distinction in reliability here.

2.) Arrange the simulation so that you can consider observations pairwise (using the same random number seeds for each configuration and considering the differences in observed values as independent observations). Compute the interval estimates directly for the differences. Are the differences between configurations now significant?

Queue Length Mean Differences:

- The comparison of (3, 4) against (3, 5) gives a mean difference CI of (-0.00, 0.10), indicating no significant difference as zero falls within this interval.
- Between configurations (3, 5) and (4, 5), the mean difference CI is (0.00, 0.11). This cannot conclusively exclude zero due to minimally containing it, hinting at potential significance but should be interpreted with caution.

Utilization Mean Differences:

- For the (3, 4) vs. (3, 5) comparison, the utilization difference CI of (-0.13, 0.07) includes zero, signifying no significant difference.
- Between (3, 5) and (4, 5), CI (-0.10, 0.06) also encompasses zero, thus not significant.

3.) The blocking of the operation room is the most interesting quantity but its reliable estimation is difficult. As blocking can occur only when the operation ends while all recovery units are busy, consider observing the probability of all recovery units being busy. Does this have a smaller or larger (relative) confidence interval when you compare between different configurations?

Blocking probability was uniformly observed at 0.0000 across configurations. Since no blocking events were recorded during the simulation, the confidence interval is effectively zero. This suggests no blocking events occurred in the simulation windows considered.

As for the relative size of the intervals, with the blocking probability effectively being zero, their confidence bounds were consistently narrow. If there were any recorded events and variability amongst configurations, we would expect different width intervals.