Experimental Design

1. Determining Number of Runs, N

Since our simulation does not have any initial bias, we did not have to worry about statistical analysis on the long run average time.
We considered statistical analysis on the expected average boarding time, through this relationship:

Given α and ϵ close to 0, we want to find n large enough such that

$$P\left(|\bar{X}_n - E[X]| < \epsilon\right) \geq 1 - \alpha.$$

However, since we could afford to run a large number of simulations, we could apply the Central Limit Theorem (CLT) assuming the times are normally distributed. **Hence, we chose N = 500.**

2. Confidence Interval for average time, μ

$$\left(\bar{X}_n - z_{\alpha/2}\frac{\hat{\sigma}_n}{\sqrt{n}},\ \bar{X}_n + z_{\alpha/2}\frac{\hat{\sigma}_n}{\sqrt{n}}\right)$$

As aforementioned, CLT applied for a large N. In setting up a 2-sided confidence interval for the average boarding time of each strategy, we intend to answer the penultimate question: which method is the best? Our test will be at a confidence level of 99% (alpha = 0.01).