Name: _____ **Seat#:** _____ **Academic#:** _____

1. (50 pts.) Recall the problem in Midterm Exam: two MM2 systems with one queue and two queues. Let θ_1 and θ_2 be the performance measures (average mean wait time in queue). And let $\text{cov}(\hat{\Theta}_1, \hat{\Theta}_2)$ be the variance of $\hat{\Theta}_1, \hat{\Theta}_2$. of the two systems.

   Goal: estimate $\theta_1 - \theta_2$.

   Estimator: Let $\hat{\Theta}_1 - \hat{\Theta}_2$ be the estimator of $\theta_1 - \theta_2$.

   Questions.

   (a) What is the value of $\text{cov}(\hat{\Theta}_1, \hat{\Theta}_2)$ in your Flexsim code while you worked on the Midterm?

   (b) How does the $\text{cov}(\hat{\Theta}_1, \hat{\Theta}_2)$ affect the quality of $\hat{\Theta}_1 - \hat{\Theta}_2$?

   (c) Is larger $\text{cov}(\hat{\Theta}_1, \hat{\Theta}_2)$, the better quality of $\hat{\Theta}_1 - \hat{\Theta}_2$?

   (d) How do you measure a good quality of an estimator?

   (e) How can we control the $\text{cov}(\hat{\Theta}_1, \hat{\Theta}_2)$?

2. (50 pts.) About confidence interval

   (a) _____ Suppose that a 95% confidence interval of a population parameter θ is (65.5, 68.4). Does that mean that $\text{P}(65.5 \leq \theta \leq 68.4) = 0.95$? Reason.

   (b) _____ Suppose that a 95% confidence interval of a population parameter θ is (65.5, 68.4). Does that mean that the unknown paarameter θ is between (65.5, 68.4)? Reason.