Due: Wednesday, December 1st (11:59 p.m. PT.)

Reading

For Monday, November 15th, Section 5.3.2.

For Wednesday, November 17th, Section 5.3.3.

For Friday, November 19th, Sections 5.3.4 and 5.4.1. Don't worry about the details of the derivations.

For Monday, November 22nd, Chapter 1, the introduction to Chapter 2, and Section 2.2 of The Big Book of Simulation.

For Wednesday, November 24th, Sections 6.1 and 6.2 of *Network Performance Analysis* by Bonald and Feuillet.

For Friday, November 26th, Sections 6.3, 6.4 and 6.5 of *Network Performance Analysis* by Bonald and Feuillet.

For Monday, November 29th, Sections 6.1 and 6.2.

For Wednesday, December 1st, Section 6.3.

Assignment exercises to hand in

Some of the questions in this assignment require the use of the simulation software `AnyLogic`. You should download and install the Personal Learning Edition (PLE):

`https://www.anylogic.com/s/download-free-simulation-software-for-education/`.

1. In class we considered a model soccer game where Canada scores at a rate of once per 45 minutes, and Mexico at a rate of once per 90 minutes. Reproduce this model in `AnyLogic`. Starting with your SFU id as the random seed, and increasing by one after each trial, run ten 90 minute games under these conditions. For each game, write the final score, along with the times that each team scored.
2. Build a simulation of an $M/M/1$ queue using `AnyLogic`. The arrival rate is 1 customer per hour, and the mean service time is 55 minutes. Provide a printed screen shot of your `AnyLogic` model, or submit the model file on-line via `Canvas`.
3. Starting with your SFU id as the random seed, and increasing by one after each trial, run 10 independent runs of your simulation model, stopping after 40,000 hours. Record the queue length every 100 hours. It may be helpful to export this data to an `Excel` file.
4. Use the results of the experiments in the previous part to estimate the mean number of customers in the queue at a steady-state. Compare your result to the analytical formula for the expected number of customers in an $M/M/1$ queue.
5. Estimate the mean queue length at 100 hours. Note that at that time, the queue will not yet be in a steady state.
6. Estimate the time required for the expected queue length to reach 80% of its steady-state value. Explain your reasoning or computation method.
7. Chapter 5, Exercise 24
8. Chapter 5, Exercise 25
9. Chapter 5, Exercise 29

10. Chapter 5, Exercise 37
11. Chapter 5, Exercise 44
12. Chapter 5, Exercise 50

Some other exercises you should try

The textbook has many worthwhile exercises, you are encouraged to try as many as you can. There are also a few (solved) exercises in the Bonald and Feuillet chapter.

Final Exam

The final exam schedule has now been released. Our exam is on Friday, December 17th from 8:30-11:30 a.m. in SWH 10061.