Homework 3

1. **Ex. 3.1.1:** (a) Modify program `ssq2` to use *Exponential* (1.5) service times.
   (b) Process a relatively large number of jobs, say 100000, and report what changes this produces relative to the statistics in Example 3.1.3.
   (c) Explain (or conjecture) why some statistics change and others do not.

2. **Ex. 3.1.5:** (a) Verify that the mean service time in Example 3.1.4 is 1.5.
   (b) Verify that the steady-state statistics in Example 3.1.4 seem to be correct.
   (c) Note that the arrival rate, service rate, and utilization are the same as those in Example 3.1.3, yet all the other statistics are larger than those in Example 3.1.3. Explain (or conjecture) why this is so. Be specific.

3. **Ex.3.3.1:** Let β be the probability of feedback and let the integer-valued random variable X be the number of times a job feeds back.
   (a) For $x = 0, 1, 2, ...$ what is $Pr(X = x)$?
   (b) How does this relate to the discussion of acceptance/rejection in Section 2.3 (i.e., Example 2.3.8)?

4. **Ex. 3.3.4:** Modify program `ssq2` to account for a finite queue capacity.
   (a) For the queue capacities 1,2,3,4,5, and 6, construct a table of the estimated steady-state probability of rejection.
   (b) Also, construct a similar table if the service-time distribution is changed to be `Uniform(1.0, 3.0)`.
   (c) Comment on how the probability of rejection depends on the service process.
   (d) How did you convince yourself these tables are correct?