

## COMP SCI/SFWR ENG 4/6E03 — Assignment 6 Solutions

1. Here, we have two M/M/1 queues with  $\rho_1 = 3p/2$  and  $\rho_2 = 2(1-p)$ . Using the expressions for expected number in system, we have that the total is

$$\frac{3p}{2-3p} + \frac{2-2p}{2p-1}.$$

I plugged this into Maple, differentiated and set the result to zero, to get the optimal value of  $p$ , 0.5774.

See the attached code. I first did the M/M/1 system, and got numbers close to what was expected from the analysis (this is one way to partially validate a simulation). I played around with the value of  $p$  for constant processing times, but could not get better than for  $p = 0.5744$ .

Two things to note here:

- (a) The expected number in system is a lot less when the processing times are constant. We have not discussed this yet, but you should think about whether this makes intuitive sense or not.
- (b) It is very difficult to get a precise value of the best  $p$  from simulation only, due to the fact that you are not getting the exact underlying value. Compare this with the analytical (M/M/1) results.