# COMP SCI/SFWR ENG 4/6E03 — Assignment 11

1. Consider the Dining Philosophers Problem. Five philosophers are seated around a circular table and are dining with chopsticks. A chopstick is placed on the table between each philosopher. Each philosopher spends an exponentially distributed period of time (with rate $\lambda$) thinking, then tries to acquire the chopsticks to the left and right in order to eat. The time spent eating is exponentially distributed with rate $\mu$. After eating, the philosopher relinquishes the chopsticks and starts thinking again (where the whole process of thinking/eating repeats).
   (a) Model this as an SPN. Note that you will have to make sure your implementation is deadlock-free.
   (b) Draw the state transition diagram (do not solve for the steady-state probabilities).

2. Consider a two processor system with shared memory. Each processor executes locally for some time (exponentially distributed with mean $1/\lambda$) and then requests access to shared memory (request times are exponentially distributed with mean $1/r$). Once a processor has gained access, the duration of the shared memory access is assumed to be exponentially distributed with mean $1/\mu$. (Note that only one processor can have access to the shared memory at a given time.)
   (a) Model this system as an SPN.
   (b) In steady-state, what is the probability that the shared memory is *not* being accessed? (For concreteness, let $\lambda = 0.1$, $r = 1$, $\mu = 0.1$.)