Math and Medicine: Homework Assignment 4
Due on Sept 22

1. Suppose people enter a simple transplant waiting list (all people are ranked equally) at rate $\lambda = 10.0$/year, organs become available at rate $\sigma = 20.0$/year, and people die at rate $\mu = 0.05$/year.

   a. Find the probability q_1 of a list of length 1 in terms of q_0.

   b. Find the probability q_i of a list of length i in terms of q_0.

   c. When these probabilities get small, stop, and solve for q_0.

   d. What is the probability of death on the waiting list?

   e. **Extra credit:** How many organs will get wasted?

2. Use the program `listsim.R` on the course web site in the kidney folder. It calls the programs `init.R` and `change.R`, which also calls the internal program `changes.R`, so you'll need to copy all of these into the same directory so they can call each other. Use them to check your answers on the first problem.

3. Find the longest chain and any cycles in this graph.