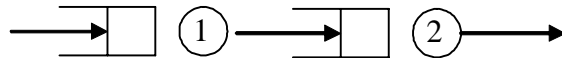


## Homework Assignment #3

**due 7:20 pm, Tuesday, April 22**

**\*\*\* Due time will be strictly enforced. Late HW is subject to at least 25% penalty \*\*\***

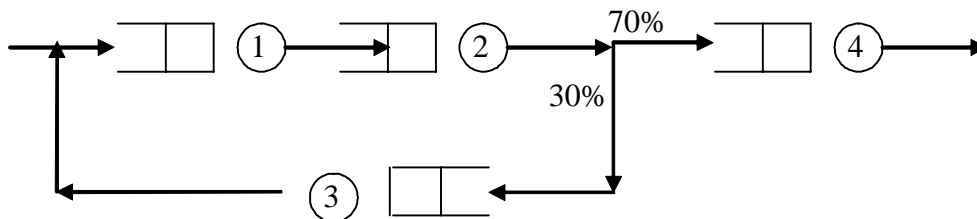
1. (20 points) A two-node tandem queue shown in the following figure. The inter-arrival times and service times at all nodes are exponentially distributed. The mean inter-arrival time is 8, and the mean service times are 5 and 6 for Nodes 1 and 2, respectively.



Please find

- a. Average queue lengths at Node 1
- b. Average queue lengths at Node 2
- c. Average total time a customer spend in the system.

2. (20 points) This system has 4 nodes with reentrant process. After node 2, 30% of customers go to node 3, while the remaining 70% go to node 4. The departure of node 3 merges with new arrivals into node 1. The inter-arrival times and service times at all nodes are exponentially distributed. The mean inter-arrival time is 8, and the mean service times at all nodes are 4.



Please find

- a. Average queue lengths at Node 1
- b. Average queue lengths at Node 4
- c. Average total time a customer spend in the system if he/she does not go through Node 3.