57:022 Principles of Design II
Quiz #11 - 10 May 2002

True (+) or False (o)?

_+_ 1. "Balking" in a queueing system occurs when a potential customer is discouraged from joining the queue to be served.

_o_ 2. Little's Law states that the time spent in a queueing system has Erlang distribution.

_+_ 3. In a birth/death model of a queueing system, the population size includes not only the waiting customers, but also any customers currently being served.

_o_ 4. "Reneging" in a queueing system occurs when a server sends a customer away without its having been served. *Note: "Reneging" occurs when customer leaves system while still in queue awaiting service.*

_+_ 5. In a birth/death model of a queueing system, a "death" refers to the departure of a customer from the system.

_+_ 6. The "utilization" of the server in an M/M/1 system is equal to $1-\pi_0$.

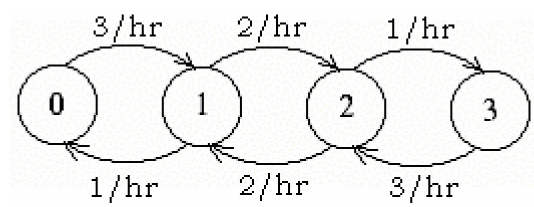
_+_ 7. Little's Law applies to any queueing system in steady state, whether or not it is a birth/death process.

_+_ 8. An M/M/1 queueing system is a birth/death process.

_o_ 9. The notation W generally refers to the average time that a customer spends waiting in the queueing system, exclusive of time being served. *Note: W includes service time.*

_+_ 10. In an M/M/1 queueing system, the number of customers arriving per unit time has Poisson distribution.

Consider the birth-death process on the right:



_+_ 11. The arrival process suggests a "finite source population."

_o_ 12. The departure process suggests a single server.

_+_ 131. A steady state exists for this system.

_+_ 14. This might be classified as an M/M/3/3/3 queueing system. *Note: # servers = # in source population = 3*

_o_ 15. The probability π_0 is equal to 1/6.

$$Note: \frac{1}{\pi_0} = 1 + \frac{3/\text{hr}}{1/\text{hr}} + \frac{3/\text{hr}}{1/\text{hr}} \times \frac{2/\text{hr}}{2/\text{hr}} + \frac{3/\text{hr}}{1/\text{hr}} \times \frac{2/\text{hr}}{2/\text{hr}} \times \frac{1/\text{hr}}{3/\text{hr}} = 1+3+3+1 = 8 \Rightarrow \pi_0 = 1/8$$

_o_ 16. All states are equally likely in steady state.

_+_ 17. State 1 is 3 times as likely as state 0 in steady state.