1. ( ) Packets arrive according to a Poisson process at a rate of 1 packet/s. What is the probability that exactly 3 packets arrive during a 1-second interval? (A) $1/e$, (B) $1/(6e)$, (C) $e^{-3}$, (D) $e^{-6}$, (E) none of the above. (where $e = 2.718...$)

2. ( ) For the above problem, what is the probability that no packet arrives during a 3-second interval? (A) $1/e$, (B) $1/(6e)$, (C) $e^{-3}$, (D) $e^{-6}$, (E) none of the above.

3. ( ) For the above problem, given that there is no arrival during the past 3 seconds, what is the probability that exactly one packet will arrive during the next second? (A) $1/e$, (B) $1/(6e)$, (C) $e^{-3}$, (D) $e^{-6}$, (E) none of the above.

4. ( ) A single-server system without a queue is either idle or serving one packet. When the server is busy, it turns away any arriving packet. Assume Poisson arrivals and Poisson services. Also assume that the system is characterized by the following 2-state Markov diagram. At steady state, what is the probability that the system is busy? (A) 0.25, (B) 0.5, (C) 0.75, (D) 0.9, (E) none of the above.

5. ( ) What is the appropriate queuing model to describe the above system? (A) M/M/1, (B) M/M/2, (C) M/M/1/1, (D) M/G/1, (E) none of the above.

6. ( ) For the above problem, if the arrival rate ($\lambda$) is 1 packet/s, what is the service rate ($\mu$)? (A) 1.5, (B) 2, (C) 2.5, (D) 3, (E) none of the above.

7. ( ) Assume that a network router can be modeled accurately as an M/M/1 system. We study the utilization of the router and find that it's busy 95% of the time. What is the average number of packets (waiting or being processed) in the bridge? (A) 5, (B) 9.5, (C) 19, (D) cannot be determined, (E) none of the above.

8. ( ) In a slotted Aloha system, the attempt rate ($G$) is given by the arrival rate ($\lambda$) plus the retransmission rate. The throughput reaches the maximum when (A) $G = \lambda$, (B) $G = e^{-1}$, (C) $G = 1$, (D) $G = e$, (E) none of the above.

9. ( ) For the above system, the throughput becomes very low for large $G$ due to (A) under utilization of the channel, (B) too many collisions, (C) low arrival rate, (D) over-killed flow control, (E) none of the above.

10. ( ) During the collision resolution period (CRP), what does the FCFS splitting algorithm do when another collision occurs? (A) sounds an alarm, (B) terminates the CRP, (C) doubles the allocation period, (D) decreases the allocation period by half, (E) none of the above.