Problem 15.1

Assume the CSMA/CA protocol of problem 12.4 with 2 nodes and parameters $\mu = 1$, $\lambda = 1/4$ and $\alpha = 3/4$.

15.1.A Compute the stationary distribution using using the flux balancing method.

15.1.B Assume that the bitrate when a packet is transmitted is 10 Mbps. Compute the average transmission time of a file of 10 Mbytes by one of the nodes.

Problem 15.2

Assume the CSMA/CA protocol with *backlogged-tone* of problem 14.3 with 2 nodes and parameters $\mu = 1$, $\lambda = 1/4$ and $\alpha = 3/4$.

15.2.A Compute the stationary distribution using using the flux balancing method.

15.2.B Assume that the bitrate when a packet is transmitted is 10 Mbps. Compute the average transmission time of a file of 10 Mbytes by one of the nodes.

Problem 15.3

Let X be a random variable equal to the failure time of a system. The reliability of the system, $R(t)$, is defined as $R(t) = P\{X > t\}$. In other words, it is the probability that the system is working at time t.

15.3.A Assume the system of figure 1, where the failure time is exponentially distributed with rate $\lambda = 1$ failures/year. Compute the reliability in 1 year.

15.3.B Assume the system with redundancy of figure 2, where 2 devices equal to the previous item work in parallel. The system fail only when the 2 devices fail. Compute the reliability in 1 year.

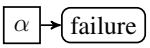

Figure 1

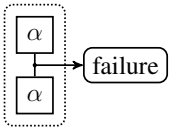

Figure 2