



1. Consider a slotted system with $n \geq 1$. In each slot, each user generates a new ethernet frame with probability λ/n , where $\lambda \in [0, 1]$. Assume that slot length is τ , and ethernet frame transmission time is T . All users use a common channel and have to compete with each other for an opportunity to successfully transmit their frames. For a long enough simulation run, average throughput is defined as number of successful transmissions upon number of slots.
 - (a) Use slotted ALOHA with $T = \tau$ and $n = 100$, and plot the average throughput as a function of λ . Plot the theoretical prediction and compare with the simulation results. Assume that frames generated are not queued. [50]
 - (b) Frames generated are queued. Use p -persistent CSMA with $T = 3\tau$ and $n = 100$, and plot the average throughput as a function of λ for $p = 0.5$ and $p = 0.01$ [50]