1. Consider a 10 Mbps Ethernet LAN that has stations attached to a 2.5 km long coaxial cable. Given that the transmission speed is 2.3 x 108 m/sec, the packet size is 128 bytes out of which 30 bytes are overhead, find the effective transmission rate and maximum rate at which the network can send data.
2. Consider an 802.3 LAN with 500 stations connected to five 500 – meters segments. The data rate is 10 Mbps and slot time is 51.2 µsec. If all stations transmit with equal probability, what is the channel utilization using a frame size of 512 bytes? Assume number of contention shots are 1.716.
3. A 1-km-long, 10-Mbps CSMA/CD LAN (not 802.3) has a propagation speed of  
   200 m/μsec. Repeaters are not allowed in this system. Data frames are 256 bits long, including 32 bits of header, checksum, and other overhead. The first bit slot after a successful transmission is reserved for the receiver to capture the channel in order to send a 32-bit acknowledgement frame. What is the effective data rate, excluding overhead, assuming that there are no collisions?