CS 372 Introduction to Computer Networks
Self-Check Exercises: Lecture 4

1) What is an access network?

2) _____ is the rate at which bits are actually transferred between sender/receiver.

3) Describe the sources of nodal delay in packet-switched networks.

4) What is the equation for end-to-end delay?

5) Consider two hosts (A and B) connected by a single link with transmission rate ***R*** bps. The hosts are separated physically by ***d*** meters along a cable for which the speed of propagation is ***s*** meters per second. Host A sends a packet of length ***L*** bits to host B
   a. Show the propagation delay d_{prop} in terms of ***d*** and ***s*:**
   b. Show the transmission delay d_{trans} in terms of ***L*** and ***R*:**
   c. Suppose Host A begins to transmit at time t = 0. At time t = d_{trans} where is the last bit of the packet?
   d. Suppose that $d_{prop} > d_{trans}$. At time t = d_{trans} , where is the first bit of the packet?
   e. Suppose that $d_{prop} < d_{trans}$. At time t = d_{trans} , where is the first bit of the packet?
   f. Let s = 2.5×10^8 m/s, L = 120 bits, R = 56 Kbps. Find ***d*** such that $d_{prop} = d_{trans}$.

6) Suppose that there are *N* packets in a router's queue. Given a constant packet length of *L*, and a constant transmission rate *R*, what is the average queuing delay for the *N* packets?