Brooklyn College, CIS Dept, CIS 748
Midterm

Name: _____

Section: _____ Id.: _____

(*Show all work. You get 20% credit for leaving an answer blank (ie: 1 point for leaving a 5 point question blank). You get no points for a wrong answer.*)

1. (10 pts) List four common LAN topologies and briefly describe their methods of operation.

2. (10 pts) Summarize the differences among unicast, multicast, and broadcast addresses. Explain how they're implemented for each topology in previous question.

3. (10 pts) For a token ring LAN, suppose that the destination station removes the data frame and immediately sends a short acknowledgment frame to the sender rather than letting the original frame return to the sender. In what ways will this affect the network (performance, functionality, latency, etc.)?

4. (10 pts) Consider a baseband bus with a number of equally spaced stations with a data rate of 10 Mbps and a bus length of 1 km. What is the mean time to send a frame of 1000 bits to antoher station, measured from beginning of transmission to the end of reception? Assume propagation speed of 200 m/μs (meters per microsecond, or 10^{-6} of a second)

5. (10 pts) Consider a baseband bus with a number of equally spaced stations with a data rate of 10 Mbps and a bus length of 1 km. If two stations begin to transmit at exactly the same time, their packets will interfere with each other. If each transmitting station monitors the bus during transmission, how long before it notices an interference?

6. (10 pts) What is the duration of a bit for each of the following signals?

   a. A signal with bit rate of 100 bps.
   b. A signal with bit rate of 200 Kbps.
   c. A signal with bit rate of 5 Mbps.
   d. A signal with bit rate of 1 Gbps.

7. (10 pts) If the bit rate of a signal is 1000 bps, how many bits can be sent in 5 seconds? how many in 1/5 seconds? How many bits in 100 milliseconds?

8. (5 pts) Explain the term *protocol stack*. Describe situations where it would be useful *not* to implement the *full* stack.

9. (10 pts) A signal is sampled. Each sample represents one of four levels. How many bits are needed to represent each sample? If the sampling rate is 8000 samples per second, what is the bit rate?

10. (5 pts) The signal travels from point A to point B. At point A, the signal power is 100 W. At point B, the power is 90 W. What is the attenuation in dB?

11. (5 pts) A line has a signal-to-noise ratio of 1000 and a bandwidth of 4000 kHz. What is the maximum data rate supported by this line?

12. (5 pts) Suppose we are transmitting data at a rate of 1000 bits per second. During transmission, the noise introduces errors so that, on average, 1% of bits are received incorrectly (a 0 as 1, or 1 as 0). What is the maximum rate at which we can transmit information over this channel?