# COSC244 Tutorial
From Lecture 1 & 2

1. List 3 guided transmission media and rank them in order of transmission distance. List 2 unguided transmission media. Which type of medium is omnidirectional.

2. Name the 3 characteristics describing an analog signal and describe them. How are a signal's period and frequency related?

3. What is the bandwidth of the telephone system? Why is it not a good idea to listen to music over the telephone?

4. Which transmission media or signals are susceptible to interference?

5. What is the relationship between data rate and baud rate? What is the relationship between data rate and bandwidth in Hz?

6. Draw the digital signals for the bit string 0010 1000 10 using NRZ, Manchester, and differential Manchester digital encoding techniques. Assume the signal is "high" prior to receipt of the first bit.

7. Suppose you want to transmit 4 bits per signal (baud). How would you do so using FSK? ASK? PSK?

8. Quadrature Amplitude Modulation (QAM) assigns a group of bits to a signal defined by it amplitude and phase shift. It often uses a diagram, called signal constellation, to describe the signals as points plotted on a coordinate system. For each point in the coordinate system, its distance from the origin represents the amplitude of the signal, and its angle with the horizontal axis represents the phase shift of the signal (increasing in an anti-clockwise direction). Determine the amplitude and phase shift of each signal represented by the points in the following signal constellation.
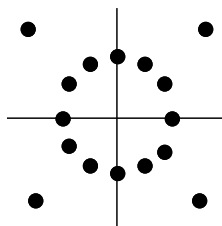
9. Describe a carrier signal, a modulating signal, and a modulated signal and give examples to explain them.

10. Try this: use letters, which represent different signals, to transmit the string

    0100 1101 0010 0010 1111 0010 0101

    between two students. Can you use one letter to carry four bits in the communication?