Ex. 14.12-page # 570

A waveform travels in space at a rate of approximately 300 million meters per second. The wavelength of sine wave is the actual distance in space that is used by one sine wave as it travels. What is the wavelength of a 100-MHz sine wave? What is the wavelength of a 500-MHz sine wave? Antenna to send and receive electromagnetic waves are often sized to be one-half of the wavelength for the particular wave being used. Compare your previous calculations to the size of VHF and UHF television antennas. How large would be a ½ wavelength antenna have to be to transmit a 60-Hz wave?

Solution:

What is the wavelength of a 100-MHz sine wave?

Lambda = c / f = (3 x 10^8 m/s) / (100 x 10^6 Hz) = 3 m

What is the wavelength of a 500-MHz sine wave?

Lambda = c / f = (3 x 10^8 m/s) / (500 x 10^6 Hz) = 0.6 m

How large would be a ½ wavelength antenna have to be to transmit a 60-Hz wave?

f = 60 Hz, Lambda = Lambda = c / f = (3 x 10^8 m/s) / (60 Hz) = 5,000,000 Hz

Antenna length = (1 / 2) x (Lambda) = 2.5 x 10^6 m = 2,500 km

Ex. 14.17-page # 472

Carefully draw a diagram that represents the binary sequence 00101110100010. Now, below your original diagram, draw the Manchester representation of the same sequence.

Solution: