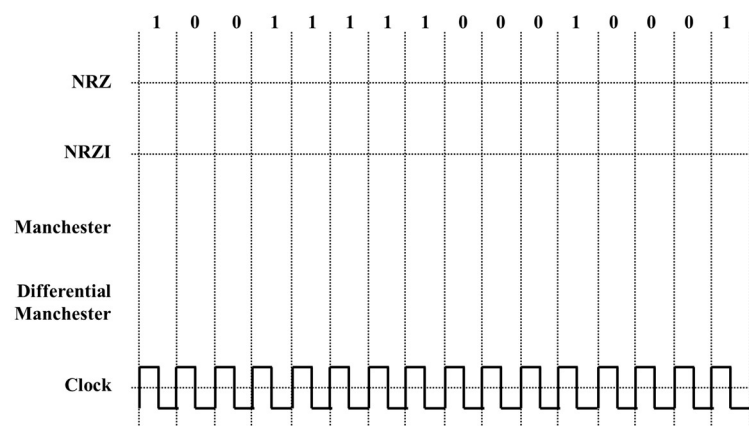


## Chapter 2 Assignments

1. A noiseless 4-kHz channel is sampled every 1 msec. What is the maximum data rate? How does the maximum data rate change if the channel is noisy, with a signal-to-noise ratio of 30 dB?
2. Show the NRZ, NRZI, Manchester, and Differential Manchester encodings for the bit pattern shown in Figure 2-1. Assuming that the 0 in Manchester encoding is encoded as a high-to-low transition and 1 being encoded as a low-to-high transition, and that the signals of NRZI and Differential Manchester start out low.



3. What are the disadvantages of Manchester Encoding?
4. A total of four stations perform code division multiple access CDMA communication. The chip sequences of the four stations are:
  - A: (-1 -1 -1 +1 +1 -1 +1 +1)
  - B: (-1 -1 +1 -1 +1 +1 +1 -1)
  - C: (-1 +1 -1 +1 +1 +1 -1 -1)
  - D: (-1 +1 -1 -1 -1 -1 +1 -1)
 Station X now receives such a chip sequence: (-1 +1 -3 +1 -1 -3 +1 +1). Which stations transmitted, and which bits did each one send?