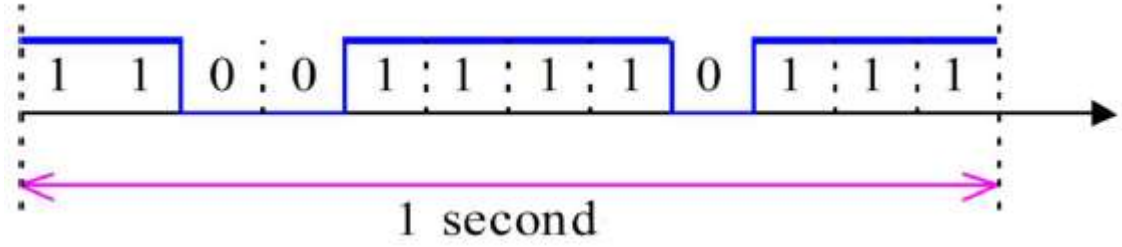
TD N°1: Physical Layer

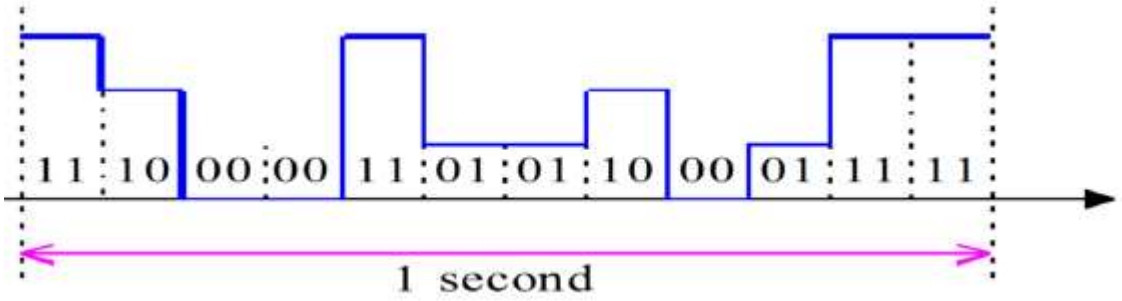
Question 1

Give the data rate and the Baud rate in the following examples

Sequence 1:



Sequence 2:



Question 2

On a transmission link, 500 characters are sent per second. Each character is represented over 8 bits (ASCII is used). The transmission quality is considered good if the destination can receive 4 harmonics (components) of the signal.

1. What is the fundamental frequency of the signal generated when sending the sequence?

2. What is the bandwidth needed for having a good-quality transmission?

Question 3

1. What is the baud rate needed to have 3000 bps knowing that the signals transmitted are binary?

2. What is the minimal Signal-to-Noise ratio (S/N) in decibels to obtain this data rate knowing that the channel bandwidth is 1 kHz?

3. What is baud rate needed if a 4-levels signal is used instead of a binary signal?

Question 4 [data rate / number of levels]

We have a channel with a 1 MHz bandwidth. The SNR for this channel is 63; what is the appropriate bit rate and number of signal level?

Question 5

A transmission medium is characterized by its cutoff frequencies: 60 kHz and 108 kHz and an S/N of 40 dB.

1. What is the maximal data rate that can be provided by this medium?

2. Same question if S/N is 80dB?