2.30)

*Most of this problem was solved in the lecture period.*

2.2)

\[
\begin{array}{ccccccccc}
0 & 1 & 0 & 1 & 1 & 1 & 1 & 0 & 0 & 1 \\
\end{array}
\]

NRZ - M

NRZ - L

2.3)

The inverter can also be located at the other input of the XOR. An XNOR could also be used instead of an XOR.

2.1)

3 ms at \( f_s = 3 \) kHz yields 9 samples. The sample values are:

\[
s = \begin{bmatrix}
0.8660 & -0.8660 & 0 & 0.8660 & -0.8660 & 0 & 0.8660 & -0.8660 & 0
\end{bmatrix}
\]
The corresponding binary values are:

\[ b = [ 0101 \ 1101 \ 0000 \ 0101 \ 1101 \ 0000 \ 0101 \ 1101 \ 0000 ] \]

The waveforms for the first 12 bits (first millisecond) are shown below. These waveforms would repeat during the second and third milliseconds.

Here is the Octave code to produce the plots above: `pr_02_01.m`.

2.6) I decoded the values from the waveform as:

\[ [ 00 \ 11 \ 11 \ 01 \ 10 \ 00 \ 01 ] \]

The corresponding staircase approximation and a possible waveform are shown below.
2.7) \( R_b = 60 \text{ kpps} \)