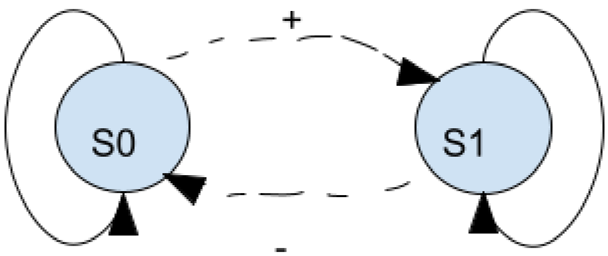
Faith-Valentine Uzoka

Assignment 4

1, 4, 6, 8, 15, 19, 20, 22, and 23

5.1 NRZI, Differential Manchester

5.4



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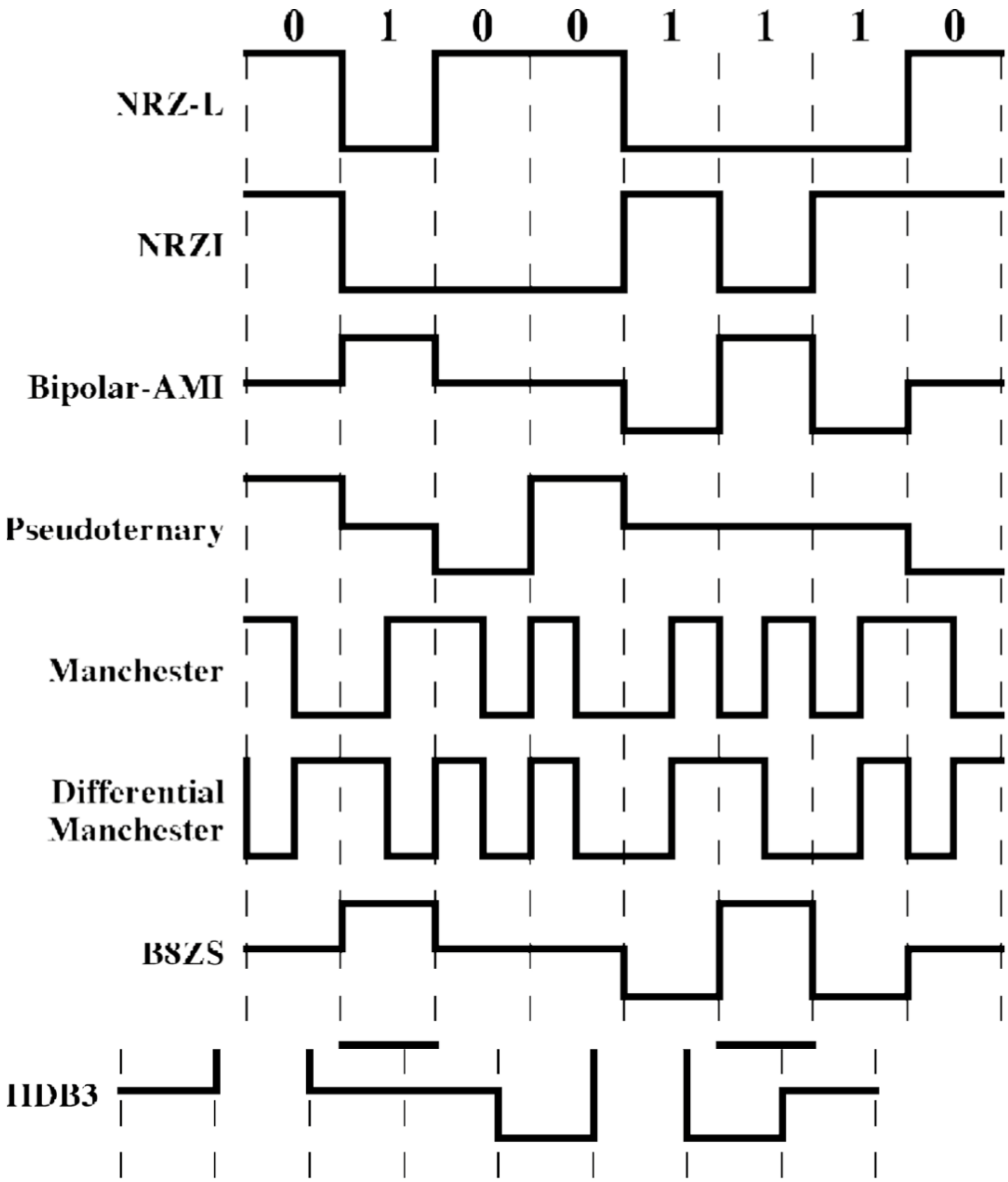
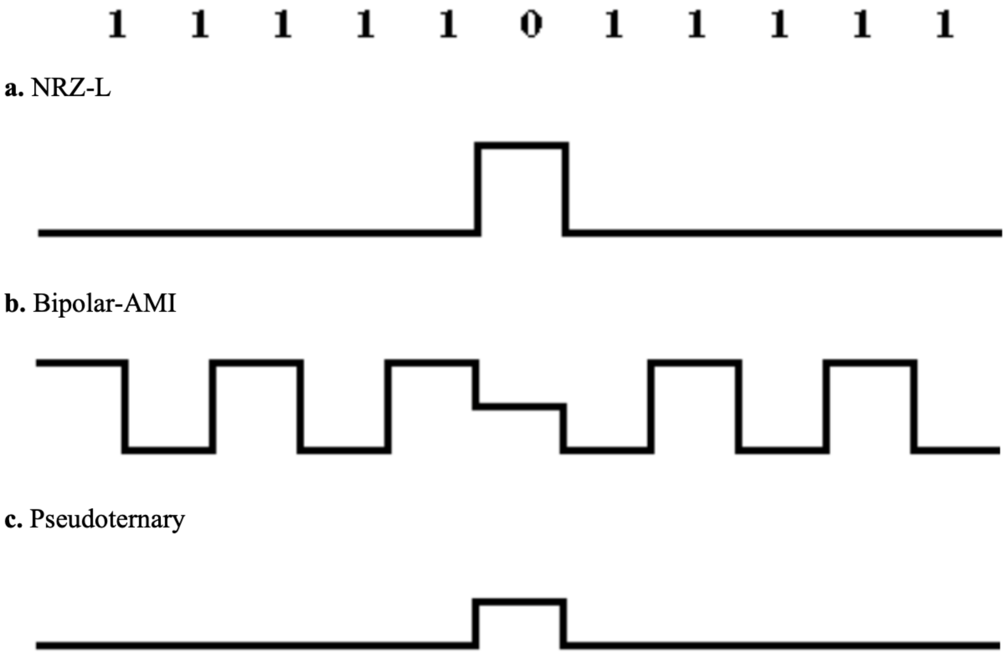
5.6



5.8



5.15 For ASK, BT = (1 + r)R = (1.5)2400 = 3600 Hz
For FSK, BT = 2 D F + (1 + r)R = 2(2.5 x 103) + (1.5)2400 = 8600 Hz

5.19 No. The demodulator portion of a modem expects to receive a very specific type of waveform (e.g., ASK) and would not produce meaningful output with voice input.
So it would not function as the coder portion of a codec. If the decoder portion of a codec is used in place of the modulator portion of a modem, it must accept an arbitrary bit pattern, interpret groups of bits as a sample, and produce an analog output.

5.20 From the text, (SNR)db = 6.02 n + 1.76, where n is the number of bits used for quantization. In this case, (SNR)db = 60.2 + 1.76 = 61.96 dB.

5.22

The maximum slope that can be generated by a DM system is $\delta/Ts = \delta fs$
where Ts = period of sampling; fs = frequency of sampling
Consider that the maximum frequency component of the signal is
$w(t) = A \sin 2\pi fat$
The slope of this component is $dw(t)/dt = A2 \pi fa \cos 2 \pi fa t$
and the maximum slope is $A2\pi fa$. To avoid slope overload, we require that
$\delta fs > A2\pi fa$ or $\delta > 2\pi faA/fs$

5.23

a) A total of 28 quantization levels are possible, so the normalized step size is 2–8 = 0.003906.
b) The actual step size, in volts, is: 0.003906 x 10V = 0.03906V
c) The maximum normalized quantized voltage is 1 – 2–8 = 0.9961. Thus the actual maximum quantized voltage is: 0.9961 x 10V = 9.961V
d) The normalized step size is 2–8. The maximum error that can occur is one-half the step size. Therefore, the normalized resolution is: + 1/2 x 2–8 = 0.001953
e) The actual resolution is + 0.001953 x 10V = + 0.01953V
f) The percentage resolution is + 0.001953 x 100% = + 0.1953 %