Problem 3.27

(a) The frequency error $\Delta f = 20$ Hz. Since this frequency error is positive and the incoming SSB wave contains the upper sideband, the frequency components of the demodulated signal are shifted downward by Δf, compared with the message signal. The demodulated signal therefore consists of three frequency components: 80, 180, and 380 Hz.

(b) When the lower sideband is transmitted, the frequency components of the demodulated signal are shifted upward by Δf, compared with the message signal. The demodulated signal therefore consists of three frequency components: 120, 220, and 420 Hz.