EE354 Homework #6

1. Lathi 5.2-7

2. Lathi 5.4-2

3. A 100 MHz carrier is frequency modulated by a sinusoidal signal that has a frequency of 75 kHz. The FM transmission has a frequency deviation of 500 kHz. Determine the absolute bandwidth, Carsons’ Rule bandwidth, and range of frequencies occupied by the FM transmission.

4. A 100 MHz carrier is frequency modulated by a sinusoidal signal that has $m_p = 20V$, $f_m = 100kHz$, $k_f = 25 kHz/V$. The FM transmission has a frequency deviation of 500 kHz. Determine the absolute bandwidth, Carsons’ Rule bandwidth, and range of frequencies occupied by the FM transmission.

5. A carrier is frequency modulated by a sinusoidal signal that has an amplitude of $A_m$ and frequency of $f_m$.
   
   (a) Determine the values of $\beta$ for which the carrier amplitude is 0.
   
   (b) Consider now that the message frequency is 1.0 kHz, and the message amplitude varies from 1.0V to 5.0V. Determine the $k_f$ and corresponding message amplitude associated with the point where the carrier amplitude disappears a second time.

6. The message signal shown below is a sawtooth waveform. Sketch the FM and PM waveforms produced by $m(t)$. Hint: plug in some numbers and use Matlab to plot.