EE354 Homework #4

1. Lathi 4.2-2 (a) Parts (i)-(iv).
   Hint: For a Triangle Wave: $V_{RMS} = \frac{V_{Pk}}{\sqrt{3}}$

2. Lathi 4.3-3

3. A DSB-SC signal has a carrier frequency of 3.8 MHz, carrier amplitude of 50V, and message signal $m(t) = 2\sin\left(2\pi\left(1.0\,kHz\right)t\right)$.
   a. Find and sketch the spectrum of the signal.
   b. Determine the total average power dissipated by the AM signal in a 50Ω load.

4. A DSB-TC AM signal with $m(t) = \cos\left(2\pi\left(3.5\,kHz\right)t\right)$ is broadcast, with a power of 400 W/Ω transmitted at the carrier frequency and 80 W/Ω is transmitted in each of the two sidebands.
   a. Determine the modulation index.
   b. If the amplitude of the un-modulated carrier remains the same but the modulation index is changed to 0.6, find the new power in the carrier and the two sidebands.