**ENEL 471 – Winter 2019**

**Assignment 4**

**Posted**: 8 February 2019

**Problems**

"Communication Systems" 5th edition by Simon Haykin and Michael Moher

3.12
3.20
3.21
3.22

**Additional Problems**

**Problem 1**

In a DSB system, the carrier is $c(t) = A\cos(2\pi f_c t)$ and the message signal is given by $m(t) = \sin c(t) + \sin c^2(t)$ . Find the frequency domain representation and the bandwidth of the modulated signal.

**Problem 2**

An AM signal has the form:

$$s(t) = \left[20 + 2\cos(3000\pi t) + 10\cos(6000\pi t)\right]\cos(2\pi f_c t)$$

Where $f_c = 10^5$ *Hz*

1. Sketch the spectrum of s(t)
2. Determine the power in each of the frequency components
3. Determine the modulation index
4. Determine the sidebands' power, the total power, and the ration of the sidebands power to the total power (the power efficiency of this modulation)