

EECS 562
Homework #2

1. A message signal is $m(t)=15\cos(2\pi t)$ volts and the carrier wave is $c(t) = 40\cos(100\pi t)$ volts, the percent modulation (sometimes called modulation index or modulation factor) is 80%
 - a. Plot the RF signal in the time domain to scale.
 - b. What is the total RF transmitted power assume a 100 ohm load.
 - c. What is the RF bandwidth?
 - d. Plot the power spectral density of the RF signal.
2. A message signal is $m(t) = \frac{t}{1+t^2}$ for the following AM percent modulations plot the RF signal
 - a. 40%
 - b. 90%
 - c. 120%
3. 3.21
4. 3.25
5. 3.28
6. Let $s(t)$ be an DSB-SC (AM) signal. The unmodulated transmitted power is 6 KW. The message signal is $m(t) = \cos(2\pi f_m t)$. The modulated transmitted power is 8 KW.
 - a. Find the corresponding A_c and k_a in equation 3.2.
 - b. What is the modulation factor?
 - c. What is the power efficiency?
 - d. What is the RF bandwidth?
7. Given a baseband bandwidth of 90kHz for signals $x_1(t), x_2(t), x_3(t) \dots x_N(t)$, i.e., $B_i=90\text{kHz}$ for $i=1 \dots N$. These signals are modulated using DSB-SC modulation. The modulated DSB-SC signals are frequency division multiplexed using a shared assigned RF spectrum of 20MHz.
 - a. Assuming no guard band find N.
 - b. Assuming a 20 KHz guard band find N.
8. An DSB-SC RF signal is plotted below. What is the modulation index (modulation factor)?

