Tutorial 3, CS1031

1. Modulation and noise

Which of the three modulation techniques (AM, FM, or PM) is the most susceptible to Gaussian additive noise? Explain your choice.

2. Signal multiplexing

Assume that a voice channel occupies a bandwidth of 4 kHz. We need to multiplex 10 voice channels with guard bands of 500 Hz using frequency division multiplexing. Calculate the total bandwidth occupied by the signals.

3. Am modulated signal

Consider the following signals:

- carrier signal: $c(t) = \cos(2\pi 100t)$
- modulating message signal: $m(t) = \cos(2\pi 20t)$

a) plot the spectrum of the modulated signal $s_{am}(t) = [1+m(t)]*c(t)$
b) plot the spectrum of the modulated signal $s_{am}(t) = m(t)*c(t)$
c) what bandwidth is required for AM ?

*Hint for a) if you need to calculate the frequency components you can use cosA*cosB = 1/2[cos(A-B)+cos(A+B)] (similarly to the exercise in tutorial 3)*