

PROBLEM:

In AM radio, the transmitted signal (voice or music) is modulated by a sinusoid at the assigned broadcast frequency of the AM station. For example, WSB in Atlanta has a *carrier frequency* of 750 kHz. For example, if $x(t)$ is the voice/music signal, then the transmitted signal would be:

$$y(t) = [x(t) + A] \cos(2\pi(750 \times 10^3)t)$$

where A is a constant. (A is introduced to make the AM receiver design easier, in which case A must be chosen to be larger than the maximum value of $v(t)$.) Suppose that the signal that is to be transmitted is

$$x(t) = 3 \cos(2000\pi t + \pi/4) + \cos(4000\pi t + \pi/2)$$

Draw the spectrum for $y(t)$ assuming a carrier at 750 kHz with $A = 2$. *Hint: Substitute for $x(t)$ and expand $y(t)$ into a sum of cosine terms of three different frequencies.*