

PROBLEM:

In this problem you will consider the general case of the “beating” phenomenon. When you multiply two sinusoids:

$$x(t) = \cos(2\pi(40)t - \pi/3) \cos(2\pi(600)t + \pi/4)$$

the signal can still be expressed as a “spectrum.” In order to do this, you need an *additive* combination of sinusoids.

- Use the inverse Euler formula to obtain a set of complex exponential signals that sum together to make $x(t)$.
- Plot the spectrum of $x(t)$.
- Find a complex signal $z(t)$ such that $x(t) = \Re\{z(t)\}$.
- Use the spectrum to write an alternate formula for $x(t)$ as:

$$x(t) = A \cos[2\pi(f_c - \Delta)t + \phi_1] + B \cos[2\pi(f_c + \Delta)t + \phi_2]$$

Find the numerical values for all the parameters: A , B , f_c , Δ , ϕ_1 , and ϕ_2 .

- This signal is periodic; determine its fundamental period.