

PROBLEM:

Suppose that you have two sinusoids: $x_1(t) = 4 \cos(77t - \pi)$ and $x_2(t) = 4 \cos(77t + 3\pi/2)$

- Determine the complex amplitudes for both sinusoids, and plot these as vectors in a two-dimensional plane. Let Z_1 denote the complex amplitude of $x_1(t)$ and Z_2 be the complex amplitude of $x_2(t)$.
- Find a complex-valued signal $z_3(t)$ such that the sum signal, $x_3(t) = x_1(t) + x_2(t)$, is $x_3(t) = \Re\{z_3(t)\}$.
- Calculate the product: $Z_p = Z_1 Z_2$, and plot the result as a vector. Use Z_1 and Z_2 from part (a).
- Explain why the product signal $x_p(t) = x_1(t) \cdot x_2(t)$ *cannot* be obtained by multiplying the complex amplitudes. (You may not have to find the product signal.)