

PROBLEM:

In all parts of this problem, consider a signal $x(t) = 100 \sin(400\pi t + \pi/2)$.

- (a) The signal $x(t)$ can be represented as $x(t) = \Re\{X e^{j\omega_0 t}\}$. Determine X and ω_0 and plot X as a vector in the complex plane.
- (b) Consider the signal $w(t) = \frac{dx(t)}{dt}$, which can be expressed as $w(t) = \Re\{W e^{j\omega_0 t}\}$. What operation on the phasor X corresponds to the operation of differentiation? That is, how is W related to X ?
- (c) Express the signal $y(t) = x(t) + w(t)$ in the form $y(t) = A \cos(\omega_0 t + \phi)$. Plot in the complex plane, all the phasors used in the solution.