

PROBLEM:

In all parts of this problem, consider a signal $x[n] = 20 \cos(0.5\pi n + \pi)$.

- (a) The signal $x[n]$ can be represented as $x[n] = \Re\{X e^{j\hat{\omega}_0 n}\}$. Determine X and $\hat{\omega}_0$ and plot X as a vector in the complex plane.
- (b) Consider the signal $w[n] = x[n - 5]$ which can be expressed as $w[n] = \Re\{W e^{j\hat{\omega}_0 n}\}$. What operation on the phasor X corresponds to the operation of time delay by 5 samples? That is, how is W related to X ? Express your answer both in terms of the general symbol $\hat{\omega}_0$ and in terms of the numerical value of $\hat{\omega}_0$ determined in part (a).
- (c) Express the signal $y[n] = x[n] + w[n]$ in the form $y[n] = A \cos(\hat{\omega}_0 n + \phi)$. Plot in the complex plane, all the phasors used in the solution.