

PROBLEM:

Consider the signal

$$x(t) = 5 + 5 \cos(3000\pi t - \pi/6) + 4 \cos(8000\pi t + \pi/2).$$

This signal has three sinusoidal components (including the “DC” component, whose frequency is equal to zero).

- (a) Express the signal $x(t)$ as a sum of five complex exponential components using the *inverse Euler* relationship

$$\cos \theta = \frac{e^{j\theta} + e^{-j\theta}}{2}.$$

- (b) Which positive and negative frequencies (in Hz) are present in this signal?
- (c) For each frequency identified in part (b), identify the complex amplitude of the corresponding complex exponential component. Give your answer as a table containing frequency in one column and complex amplitude in a second column.