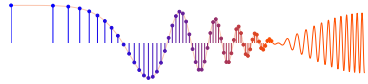

Example 3-1: Two-Sided Spectrum

For example, consider the sum of a constant and two sinusoids:

$$x(t) = 10 + 14\cos(200\pi t - \pi/3) + 8\cos(500\pi t + \pi/2)$$

When we apply the inverse Euler formula, we get the following five terms:

$$\begin{aligned} x(t) =& 10 + 7e^{-j\pi/3}e^{j2\pi(100)t} + 7e^{j\pi/3}e^{-j2\pi(100)t} \\ &+ 4e^{j\pi/2}e^{j2\pi(250)t} + 4e^{-j\pi/2}e^{-j2\pi(250)t} \end{aligned} \tag{3.5}$$

Note that the constant component of the signal, often called the ***DC component***, can be expressed as a complex exponential signal with zero frequency, i.e., $10e^{j0t} = 10$. Therefore, in the list form suggested in (3.4), the spectrum of this signal is the set of five rotating phasors represented by

$$\begin{aligned} \big\{&(0,\ 10),\ (100,\ 7e^{-j\pi/3}),\ (-100,\ 7e^{j\pi/3}), \\ &(250,\ 4e^{j\pi/2}),\ (-250,\ 4e^{-j\pi/2})\big\} \end{aligned}$$

