

## **PROBLEM:**

A signal composed of sinusoids is given by the equation

 $x(t) = 44\cos(3\pi t + \pi/6) + 55\cos(6\pi t) - 33\sin(12\pi t)$ 

- (a) Sketch the spectrum of this signal indicating the complex size of each frequency component. You do not have to make separate plots for real/imaginary parts or magnitude/phase. Just indicate the complex amplitude value at the appropriate frequency.
- (b) Is x(t) periodic? If so, what is the smallest period?
- (c) Now consider a new signal  $y(t) = x(t) + 11 \cos(5\pi t \pi/6)$ . Draw a carefully labelled sketch of the spectrum for y(t). Is y(t) still periodic? If so, what is the period?
- (d) Finally, consider another new signal  $w(t) = x(t) + 22\cos(18t + \pi/6)$ . Draw a carefully labelled sketch of the spectrum for w(t). Is w(t) still periodic? If so, what is the period?

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