MAS 160/510 Recitation 2

Friday February 17, 2012

1. **Sinusoids and periodicity:** Just because it looks like a sine doesn't make it periodic!

   (a) $x(t) = \sin(t^2)$

   (b) $x[n] = \cos(7.7\pi n)$

   (c) $x[n] = \sin(5n)$

2. **Integration!**

   We have represented a period function with period $T_0 = 1/f_0$:

$$x(t) = X_0 + \Re e\{\sum_{k=1}^{\infty} X_k e^{j2\pi k f_0 t}\} \tag{1}$$

   We know that the coefficients can be found using the following equations:

$$X_0 = \frac{1}{T_0}\int_0^{T_0} x(t)dt \tag{2}$$

$$X_k = \frac{2}{T_0}\int_0^{T_0} x(t)e^{-j2\pi kt/T_0}dt \qquad \text{for } k \neq 0 \tag{3}$$

   We will attempt to show *why* these analysis equations work!

   Evaluate the following integral in each of two cases:

$$\int_0^{T_0} e^{j2\pi n f_0 t} e^{-j2\pi m f_0 t}\, dt$$

   (a) For $n = m$:

   (b) For $n \neq m$:

3. **More integration??!**

   (a) $\int |x| dx$

   (b) $\int te^{j2\pi ft} dt$