

ECE 343 - Homework #5

Complex Fourier Transform - Summer 2018

Assume all functions are periodic in 2π

$$x(t) = x(t + 2\pi)$$

$$\omega_0 = \frac{2\pi}{T} = 1$$

Express the Fourier transform as

$$x(t) = c_0 + \sum c_n e^{jnt}$$

1) Find the complex Fourier transform for

$$x(t) = \begin{cases} 1 & 0 < t < 1 \\ 0 & 1 < t < 2\pi \end{cases}$$

Plot $x(t)$ along with its Fourier approximation taken out to the 20th harmonics

2) Use Matlab to find c_n using numerical methods. Compare your numerical solution with what you got for problem #1

3) Find the complex Fourier transform for

$$x(t) = \begin{cases} t & 0 < t < 1 \\ 0 & 1 < t < 2\pi \end{cases}$$

Plot $x(t)$ along with its Fourier approximation taken out to the 20th harmonics

4) Use Matlab to find c_n using numerical methods. Compare your numerical solution with what you got for problem #2