

ECE 343 - Homework #4

Fourier Transform - Summer 2018

Assume all functions are periodic in 2π

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

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

1) Find the 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) Find the Fourier transform for

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

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

Note that

$$\sin^2(t) = \left(\frac{1 - \cos(2t)}{2} \right)$$

3) Find the Fourier transform for

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

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