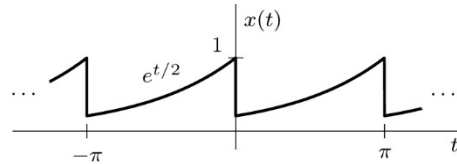


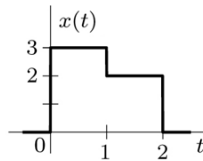
ENGR 4333/5333: Digital Signal Processing

HW 0: Ch 1 and Ch 2.1-2.2

1) Find the exponential Fourier and sketch the corresponding spectra. Find the compact trigonometric series.



2) Use the Fourier transform integral to find the Fourier transform of the signal shown below. Verify your answer by using the table and the Fourier transform properties.



3) Find the response of an LTIC system with transfer function $H(s) = \frac{3s}{s^2+2s+2}$ to the following everlasting sinusoidal inputs:

a) $x(t) = 10 \sin(3t-80)$

b) $x(t) = e^{-t} \cos(2t)$

4) For the transfer functions $H(s) = \frac{s^3}{s^3+20s^2+200s+1000}$ determine and plot the poles and zeros of $H(s)$, and use the pole and zero information to predict overall system behavior. Confirm your predictions by graphing the system's frequency response (magnitude and phase).

5) Consider the all-pass filter specified by the transfer function $H(s) = (s-2)/(s+2)$. Verify the all-pass character of the filter by plotting the system frequency response (magnitude and phase). Can this filter be considered distortionless? Explain.