

Assignment 1

Exercise 1

Consider the function

$$x(t) = -2 + 3 \sin 0.6t - 4 \cos 0.6t - 2.4 \cos 2.7t$$

- (i) Is it a periodic signal?
- (ii) Express the signal $x(t)$ in terms of exponentials and analyse what frequency components $x(t)$ has?? Can you visualize a negative frequencies??
- (iii) Represent $x(t)$ in polar form. Also find what are the coefficients of the frequencies present in the signal $x(t)$.
- (iv) Can you find if the coefficients derived in (iii) are
 - a) real or complex valued??
 - b) conjugate symmetric with other derived coefficients??
 - c) Plot the magnitude and phase against frequency. Did you observe some symmetry in magnitude and phase plots??

Exercise 2

What are the fundamental frequency and fundamental period of ~~the~~ the signal

$$x(t) = 2 \cos 4t + 2 \sin 4t$$

Express the signal in terms of sum series of complex exponentials. Plot the magnitude and phases of its coefficients against frequency. Is the magnitude plot even? Is the phase plot odd?

Exercise 3 Repeat above exercise for signal

$$x(t) = 3 + \cos 2t - 2 \sin 6t$$

Exercise 4 :-

Is the CT Signal

$$x(t) = 1.5 - 2 \sin t + 3 \cos t + 1.2 \sin \pi t$$

periodic? Verify that the magnitude plot of its complex exponential expansion is even. Is the phase plot odd?

Exercise 5 :

Summarize in few sentences what did you learn from this exercise? See the COs (course outcomes) for Signals and Systems course from your course scheme and find which COs this exercise is aligned with??