Homework 04

Problem 1: (30 points)

You decide to transfer one signal *s(x)* (*i.e.*, $s(x) = e^{-2|x|}$)and make the *f(x)* as the carrier wave. Based on the modulation technique, you can create one new signal *r(x)* containing the *s(x)* and *f(x)*. Please describe the formulation of the *r(x)* in the frequency domain.

Answer

Problem 2: (30 points)

Please compare how many add and how many multiplication are involved to compute the 4-point DFT and 4-point FFT respectively.

Answer

Problem 3: (30 points)

Please apply the Laplace Transform to solve the differential equation

$$y'' + 4y' + 3y = e^t; y(0) = 0, y'(0) = 2$$

Answer

Problem 4: (10 points)

Image that you need to design a problem of the final exam to your friends. Please design a problem or problem group (題組) with detail solutions. Your designed problem must be related to our teaching scope (*i.e.*, Fourier Integral, Fourier Transform, DTFT, DFT, and FFT), which is introduced after the midterm exam. You are allowed to design your problem with either Chinese or English.

Answer