Homework questions

Week 1

This homework will not be collected or graded. You may consult your notes, classmates, or the internet. It is purely for your benefit.

a) Define a Dirac delta function in terms of a limit and a rectangle function.

b) What is the sifting property of the Dirac delta function?

c) Given a signal $x(t)$ that is to be sampled at a rate 10 Hz, write an expression for the sampled signal using Dirac delta functions.

d) A real valued signal is sampled at 1 MHz, producing the spectrum below. Give three examples of signals which could yield this spectrum. You may assume that the stems in the diagram have unit height.

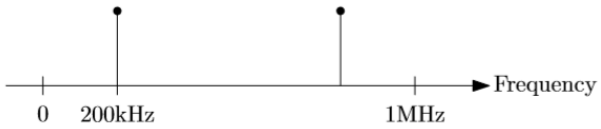

Fig. 1. Spectrum for question d.

e) The first 4kHz of a signal's amplitude spectrum is plotted below. Describe the properties of the signal in the frequency and the time domain.

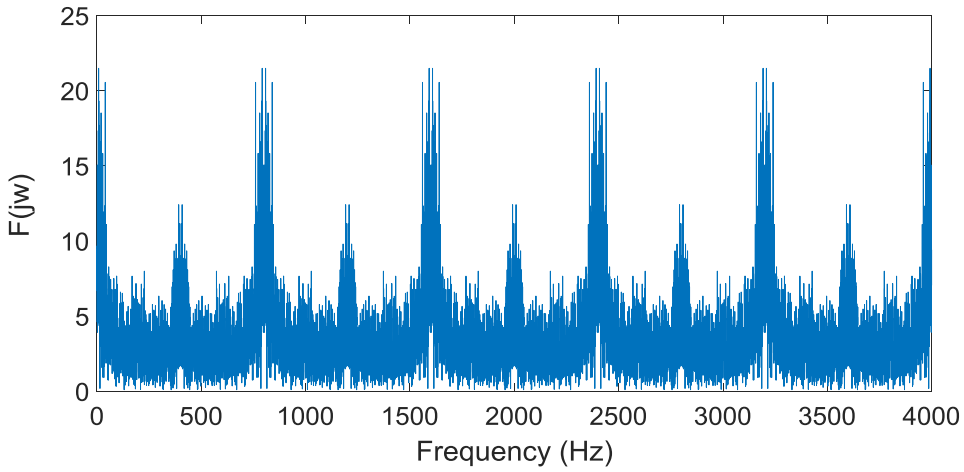

Fig. 2. Spectrum for question e.