Project 1.

Complete the examples introduced in the lecture.

```
FFTindex.m
FFTresampling.m
imageadjust.m
imagehistogram.m
histequal.m
histmatching.m
```

Project 2.

A continuous waveform is described for $t \geq 0$ as follows:

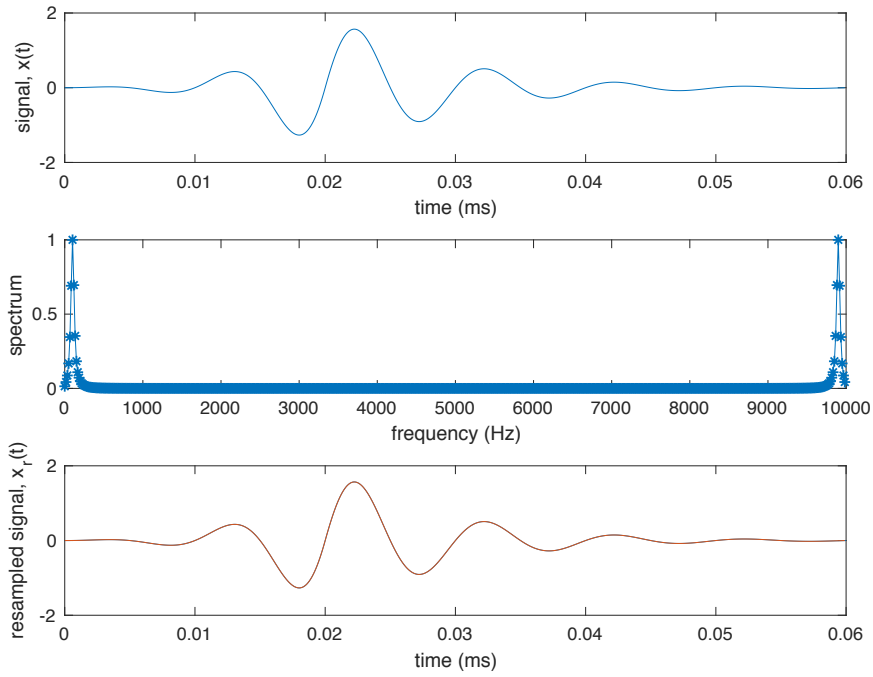
$$x(t) = 100te^{-150|t-0.02|}sin(200\pi t)$$

a. Create a sample vector, x, of x(t) in the range t=[0, 0.06) seconds using time step T=0.1 milliseconds. In the upper of three subplots, plot x(t) as a continuous curve through the points in x.

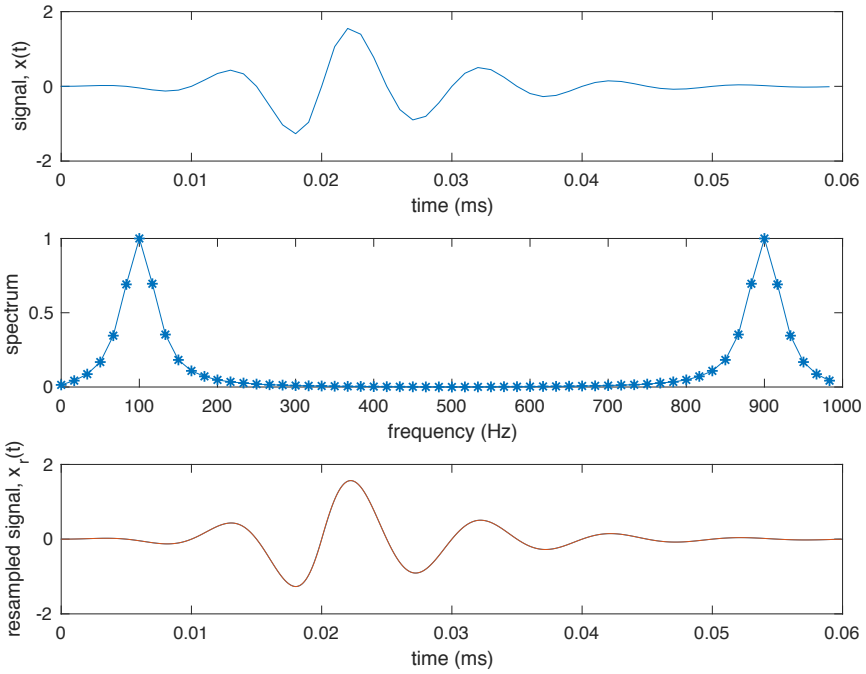
b. In the middle subplot, make a connected discrete plot of the amplitude spectrum in terms of the complete DFT of x versus frequency in the range [0, 10] kHz. Based on the spectrum plot, estimate the lowest sampling frequency for x(t) that would not violate the sampling theorem.

c. Resample the sample vector with 10 times more sample number using a Matlab function, resample(x, p, q). In the lower subplot, plot resampled signal. Discuss the difference between the resampled signal and the original continuous waveform, x(t).

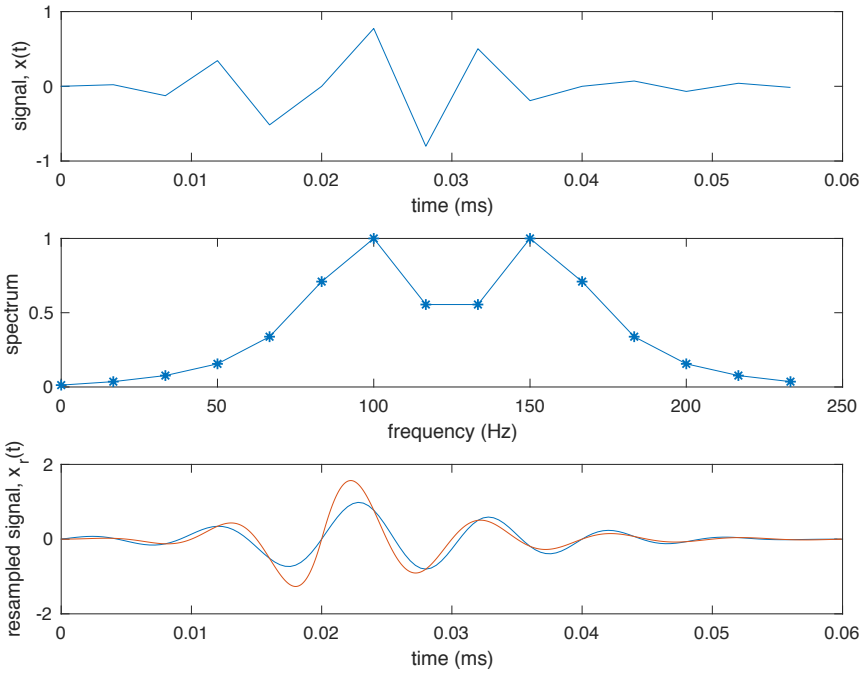
d. Repeat a-c, with a time step T = 1, 2, 3, 4 milliseconds.



T = 0.1 msec



T = 1 msec



T = 4 msec

Project 3.

Image contrast adjust and Histogram equalization

Generate figure 1 (4X2 subplots).

(a) Load and show `'FigP0304.tif'` in the 1X1 subplot. Display histogram in the 1X2 subplot.

(b) Adjust image contrast to show patterns hidden in black squares. Plot image and histogram in 2X1 and 2X2 subplots, respectively.

(c) Histogram-equalize it using the global function, histeq. Plot image and histogram in 3X1 and 3X2 subplots, respectively.

(d) Then, process it with the provided custom function, localhisteq, using neighborhoods of sizes 3 x 3. Plot image and histogram in 4X1 and 4X2 subplots, respectively (localhisteq runs slow).