

EE1330: Digital Signal Processing, Spring 2017

Indian Institute of Technology Bhilai

Assignment Solutions

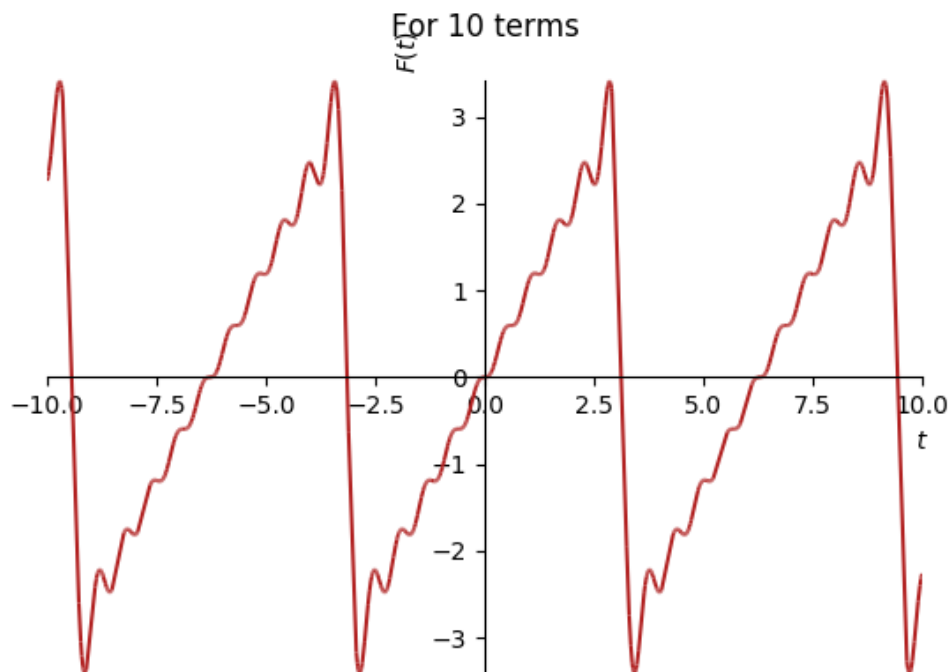
(2) Programming (Python)

(1) Observation:

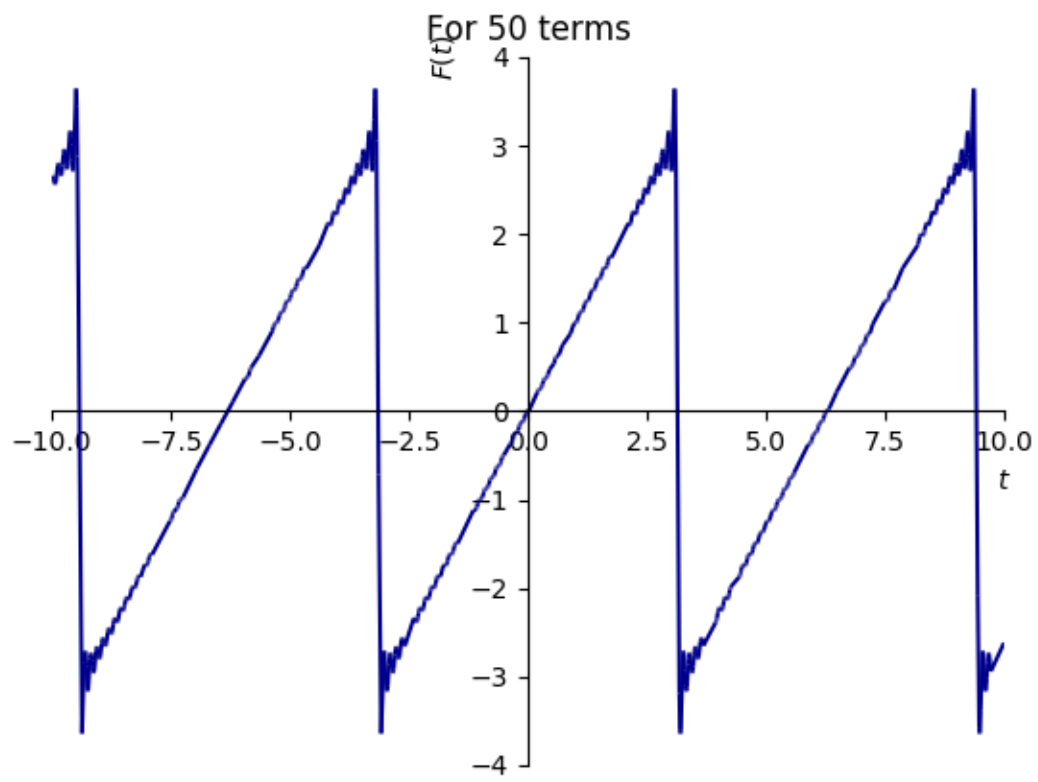
It is observed that as number of terms get on increasing in the fourie series , it tends to the original graph and discontinuity appears in the graph of fourier series.

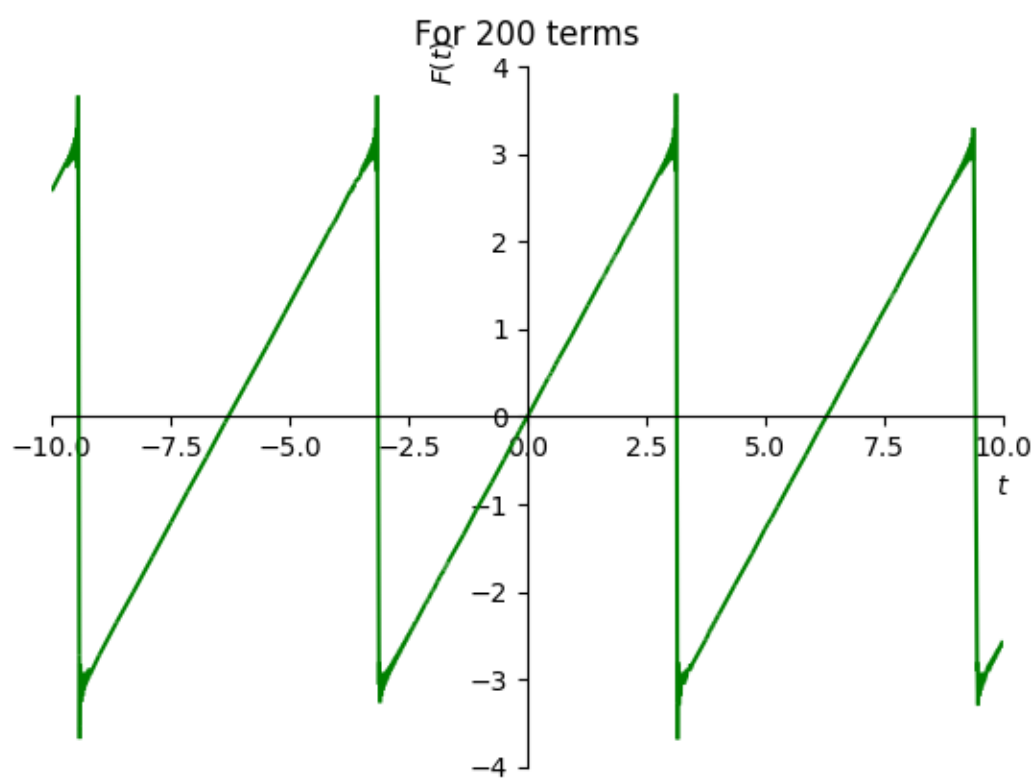
Q(1) a

For $n = 10$ terms



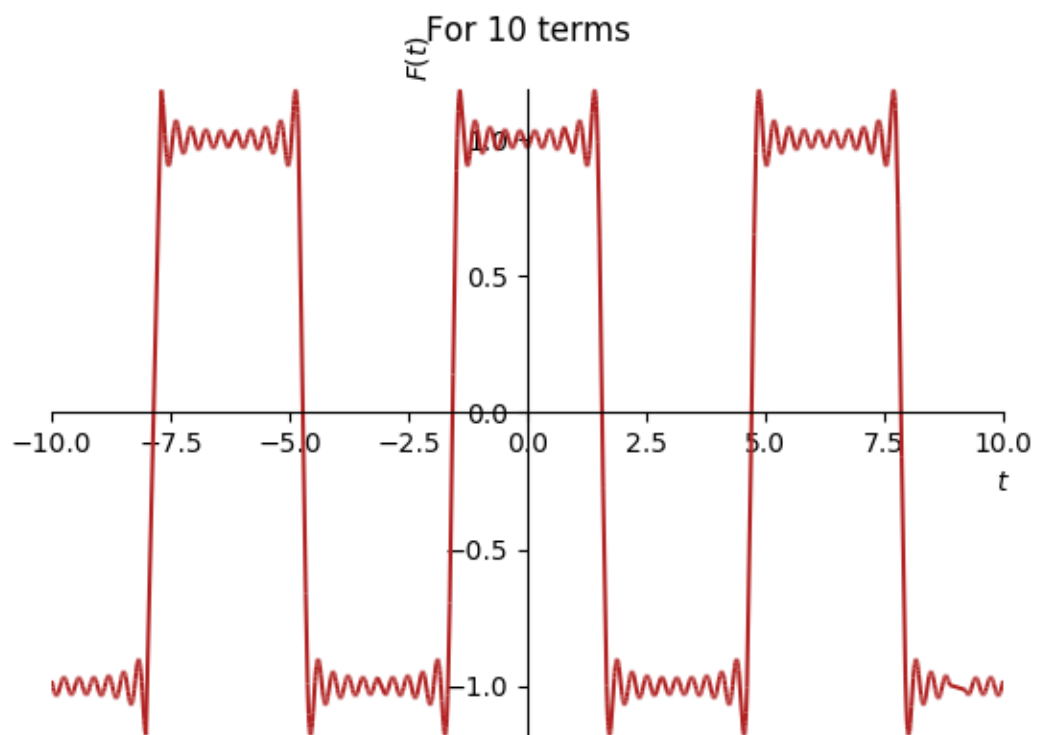
For $n=50$ terms

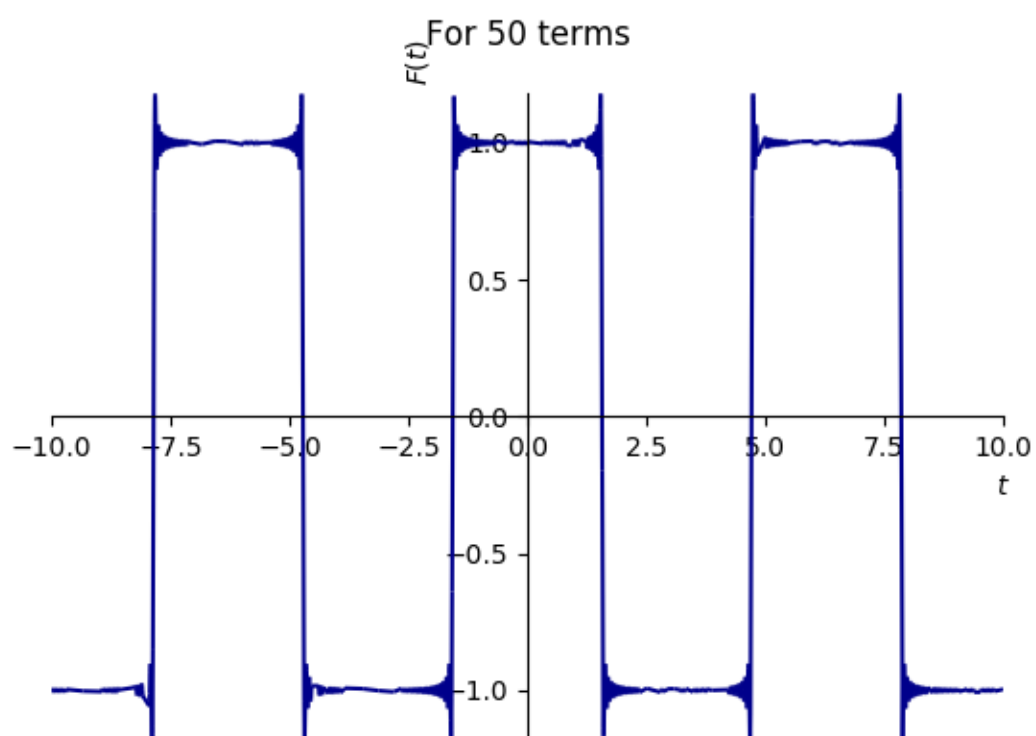




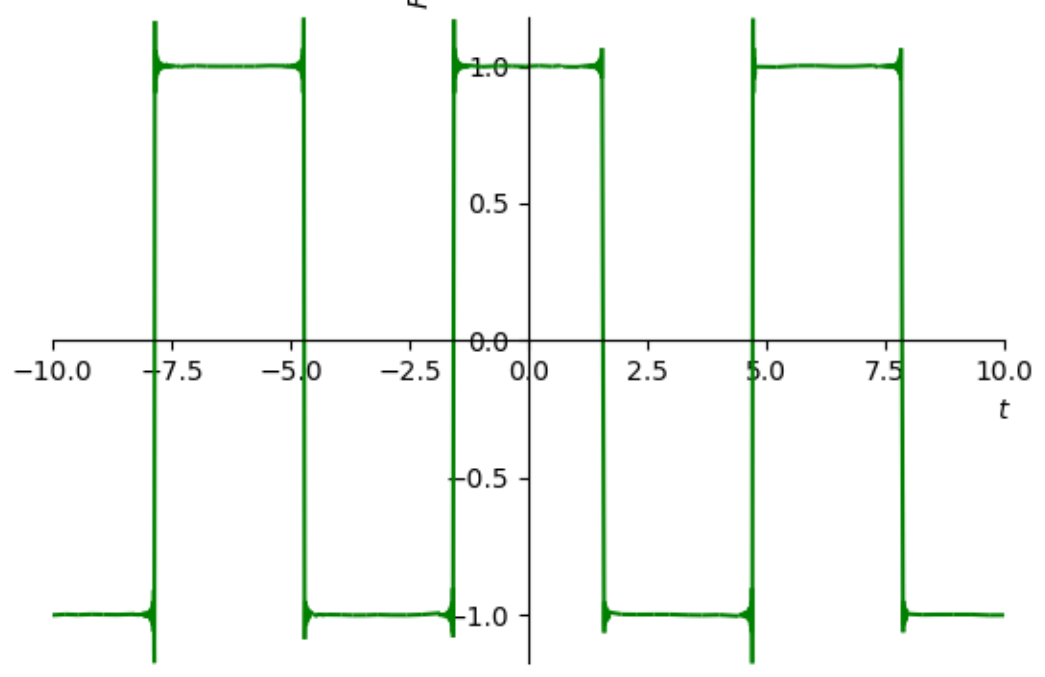
Q1(h)

For n= 10 terms



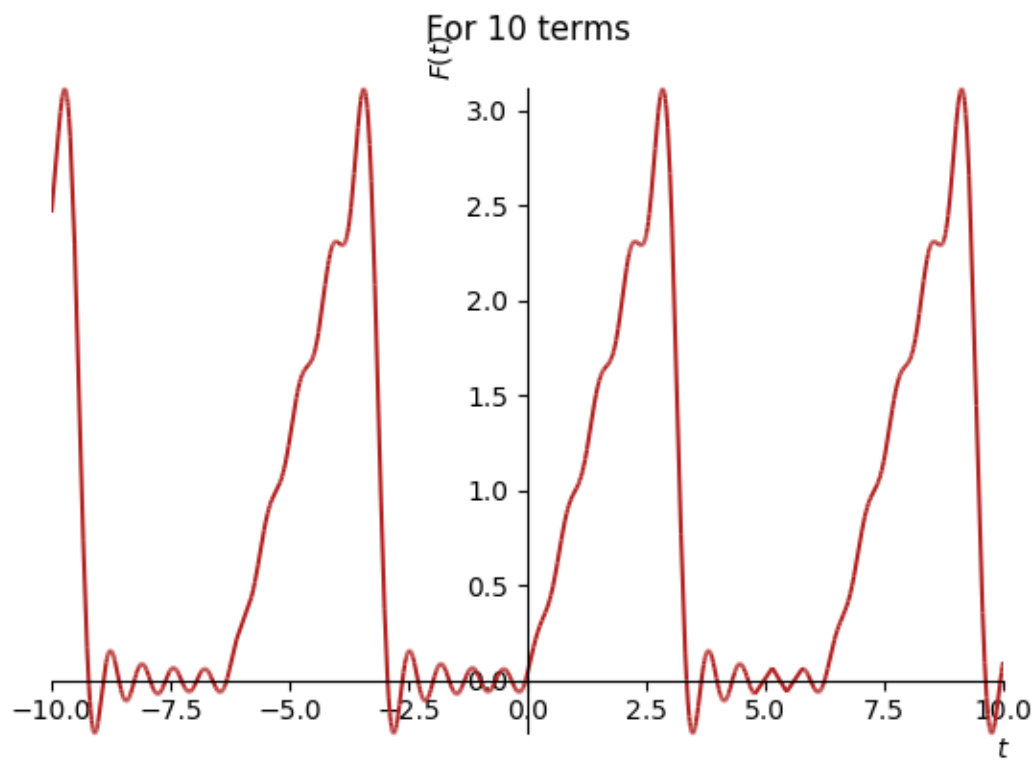


For 200 terms

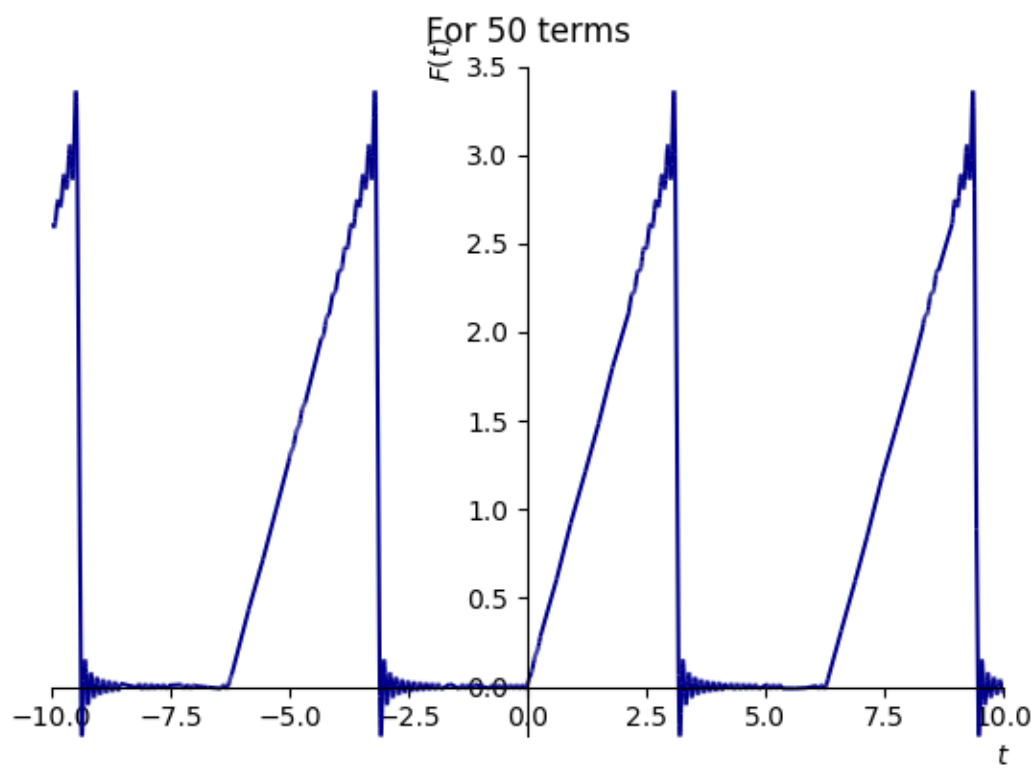


Q1(j)

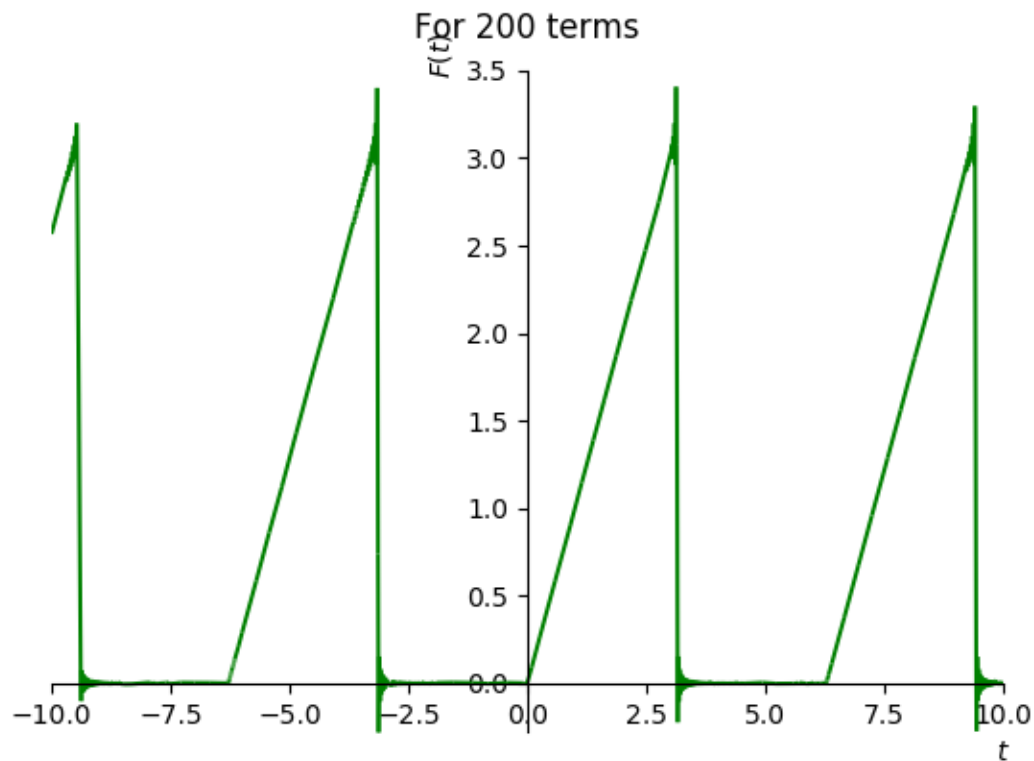
For n=10 terms



For n=50 terms



For n=200 terms



(2) **Observation:**

In this experiment I observe that as the sampling rate decreases from 44100Hz to 8000Hz female voice pitch decreases and speed of play also decreases.

In case of male voice , quality of sound gets flatter but more than the female voice.

Reason for this observation is as follows:

Let W_s is the frequency of input signal.

and W_m the frequency of sampling signal.

When $W_s \leq 2W_m$ Aliasing occurs. That is on lowering the sampling frequency, W_s , below 44100 Hz overlap occurs between the samples.

So it is not possible to reconstruct the original signal.

Though the sample of input and output signal remains the same.

As we goes on lowering the W_s the frequency of output signal decreases. Hence sound gets flatter and flatter ie. pitch decreases.