SP Lab Report – 1

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Q1

The function to compute fourier coefficients is in fourierCoeff.m

(a) The script is in file q1_a.m and plot is q1_a.png
(b) The script is in file q1_b.m and plot is q1_b.png

Q2

The function to partially reconstruct signal is in partialfouriersum.m

(b) The script is in file q2_b.m. It has the fourierCoeff function to first find the array to be passed to partialfouriersum function. The plot is in q2_b.png

(c) The script is in file q2_b.m. It displays the value of maximum absolute error and RMS error on command window.

Obtained Output :

```
>> q2_c
Maximum Absolute Error is:
   1.3323e-15

RMS Error is:
   4.4017e-16
```

Q3

(b) It has three scripts for different values of T and three different corresponding plots.

(c) It has a single script in which the value of N was modified to find plots for those values. (N = 10, 50, 100)

We can clearly observe that on increasing the value of N, the plot of reconstructed signal becomes more and more close to the original signal. This happens as on increasing N we get more fourier coefficients and thus can recreate the signal better.

Gibbs phenomenon can be observed which states that for a periodic signal with discontinuities, if the signal is reconstructed by adding the Fourier series, then overshoots appear around the edges. These overshoots decay outwards in a damped oscillatory manner away from the edges.

It decreases as our N increases.

Q4

It has two scripts for plotting fourier coefficients of $x_1(t)$ and $x_2(t)$, respectively.

$x_1(t)$ is an even function. We observe that plot of its fourier coefficients is also an even function.

$x_2(t)$ is an odd function. We observe that plot of its fourier coefficients is also an odd function.