정보통신 수학 및 실습
Lab assignment

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Chapter 10 Lab Assignment

1. The Fourier Series of the following function is as follows: .

$$f(t) = \frac{4}{\pi}\sin t + \frac{4}{\pi}\frac{\sin(3t)}{3} + \frac{4}{\pi}\frac{\sin(5t)}{5} + \frac{4}{\pi}\frac{\sin(7t)}{7}$$

a) Define a variable t having 201 points between $-\pi$ and π using MATLAB.

b) Define a variable $a_1 = \frac{4}{\pi}\sin t$ having 201 points between $-\pi$ and π using a variable t defined in (a) and plot it.

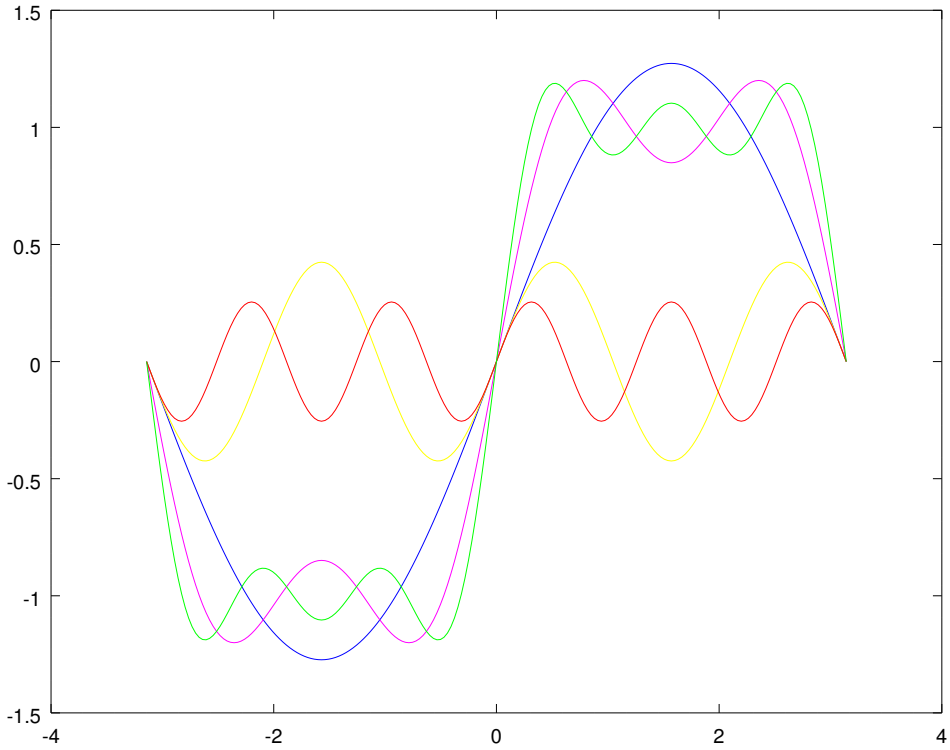
c) Define a variable $a_3 = \frac{4}{\pi}\frac{\sin(3t)}{3}$ having 201 points between $-\pi$ and π using a variable t defined in (a) and plot it over the figure in (b).

d) Define a variable $f_2(t) = a_1(t) + a_3(t)$ having 201 points between $-\pi$ and π and plot it over the figure in (b).

e) Define a variable $a_5 = \frac{4}{\pi}\frac{\sin(5t)}{5}$ having 201 points between $-\pi$ and π using a variable t defined in (a) and plot it over the figure in (b).

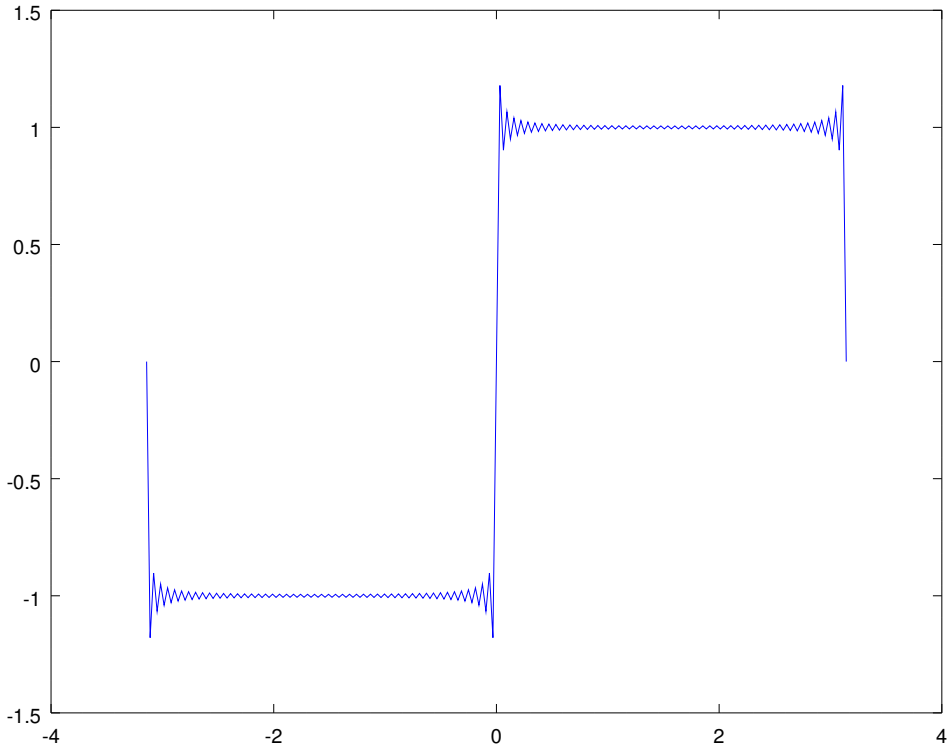
f) Define a variable $f_3(t) = f_2(t) + a_5(t)$ having 201 points between $-\pi$ and π and plot it over the figure in (b).

```
t = linspace(-pi, pi, 201);
a1 = (4/pi) * sin(t);
plot(t, a1)
a3 = (4/pi) *(1/3) *sin(3* t);
hold on
plot(t, a3, 'y')
f2 = a1+a3;
plot(t,f2,'m');
a5 = (4/pi)*sin(5* t) /5;
plot(t,a5,'r')
f3 = f2 + a5;
plot(t, f3, 'g')
```



g) Define a variable $f_N(t)$ that add the first N items of the Fourier Series having 201 points between $-\pi$ and π and plot it over the figure in (b) by programming a loop of N=100.

```
t = linspace(-pi, pi, 201);
fn = zeros(1,201);
for N = 1:2:100
    fn = fn + 4 / pi * sin(N*t)/N;
end
plot(t, fn)
```


1.5
1
0.5
0
-0.5
-1
-1.5
-4
-2
0
2
4