Date: 26/May/2020 course: Digital signal processing

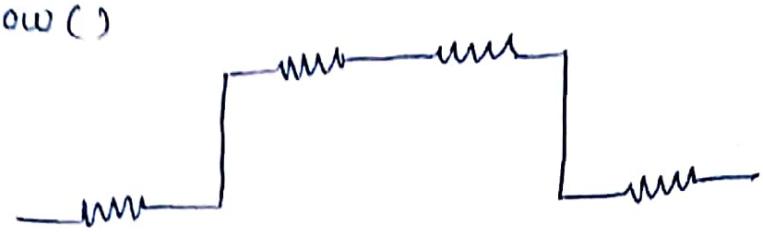
* fourier series and Gibbs phenomena

```
import numpy as np
import mat.plot lib.pyplot as plt
plt.rcParams['figure.figsize'] = [8,8]
plt.rcparams.update ({'font.size': 18})
dx = 0.01
L = 2* np.pi
x = np.arange (0, L+dx, dx)
n = len(x)
nquart = int (np.floor (n/4))
f = np.zeros_like (x)
f [nquart : 3 * nquart] = 1
A0 = np.sum (f * np.ones_like (x)) * dx * 2/L
fFS = A0/2 * np.ones_like (f)
for k in range (1,101):
    Ak = np.sum (f * np.cos (2 * np.pi * k * x/L) * dx * 2/L
    Bk = np.sum (f * np.sin (2 * np.pi * k * x/L) * dx * 2/L
fFS = fFS + Ak + np.cos (2*k * np.pi * x/L) + Bk * np.sin (2*k
                                    * np.pi * x/L)
plt.plot (x, f, color = 'k', linewidth = 2)
```

plt.plot(x, fps, '-', color='r', linewidth = 1.5)

plt.show()

o/p



* Fourier transform derivation :-

$$\hat{f}(\omega) = F(f(x)) = \int_{-\infty}^{\infty} f(x)\, e^{j\omega x}\, dx$$

$$f(x) = f^{-1}(\hat{f}(\omega)) = \frac{1}{2\pi} \int_{-\infty}^{\infty} \hat{f}(\omega)\, e^{j\omega x}\, d\omega$$

$$F\left[\frac{d}{dx} f(x)\right] = \int_{-\infty}^{\infty} \frac{d}{dx} f\, e^{j\omega x}\, dx$$

$$= -j\omega \int_{-\infty}^{\infty} f m\, e^{j\omega x}\, dx = \frac{j\omega F_1(f(x))}{F\left(\frac{df}{dx}\right)}$$

* $F(f * g) = F(f)\, F(g) = \hat{f}\,\hat{g}$

$$f^{-1}(\hat{f}\hat{g})(x) = \frac{1}{2\pi} \int_{-\infty}^{\infty} \hat{f}(\omega)\, \hat{g}(\omega)\, e^{j\omega x}\, d\omega$$

$$= \int_{-\infty}^{\infty} g(y)\, f(x-y)\, dy$$

$$= f * g$$

$$F(\omega) = \int_{-\infty}^{\infty} f(t)\, e^{j\omega t}\, dt$$

$$F(\omega) = \int_{-\infty}^{\infty} f(t) \cos(\omega t)\, dt + j \int_{-\infty}^{\infty} f(t) \sin(\omega t)\, dt$$

* Z transform in matlab

```
syms n w0;
% signal
a = n+1;
disp('the input equation is');
disp(a);
```

% taking z transform

b = z trans (a)

o/p = a = a^n

b = z trans (a)

b

$b = \frac{z}{z-a}$

a = sin(wn)

b = z trans (a)

disp (b)

$\frac{(z \sin(w))}{z^2 - 2\cos(w)z + 1}$

Afternoon session — Python

(4) Application 4 : Build a Personal website with python and Flask

→ Building first website :-

first create a python file and then write the code in that file

```
from flask import Flask
app = flask (__name)
@app.route ('/')
def home():
    return render_template ("home.html").

@app.route ('/about/')
def about():
    return render_template ("about.html")
```

```
if __name__ = "__main__"
    app.run(debug=True)
```

```
<!DOCTYPE html>
<html>
    <body>
        <header>
            <div class = "container">
            <h1 class = "logo"> Bradit's webpage </h1>
            <strong> <nav>
            <ul class = "menu">
            <li> <a href = "{{ url_for('home') }}">
                                                Home</a>
<li> <a href = "{{ url_for('about') }}"> about </a>
</ul>
</nav> </strong>
</div>
</header>
<div class = "container">
        {% block content %}
        {% endblock %}
        </div>
        </body>
        </html>
```