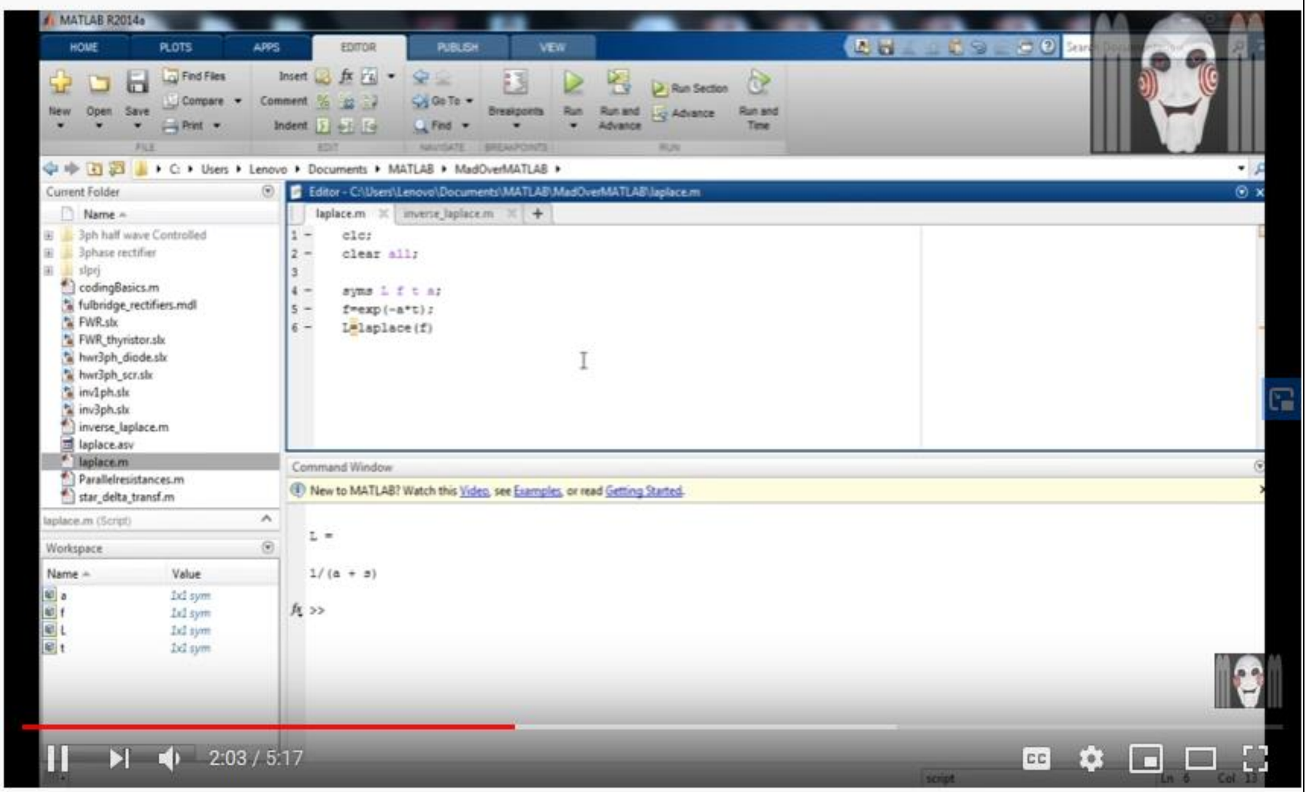
DAILY ASSESSMENT FORMAT

Date:	**26 may 2020**	**Name:**	**nishanth**
Course:	**Digitial signal processing**	**USN:**	**4al17ec063**
Topic:	1.Fourier Series & Gibbs Phenomena using Python 2.Fourier Transform 3.Fourier Transform derivatives 4.Fourier Transform and Convolution 5.Intuition of Fourier Transform and Laplace Transform 6.Laplace Transform of First order 7.Implementation of Laplace Transform using Matlab 8.Applications of Z-Transform 9.Find the Z-Transform of sequence using Matlab	**Semester & Section:**	**6^{th} & B**
Github Repository:	**nishanthvr**		

FORENOON SESSION DETAILS
Image of session



Laplace Transform and Inverse laplace Transform Using MATLAB | Mad Over Matlab Tutorials

Report – Report can be typed or hand written for up to two pages.

Nishanth

day-2

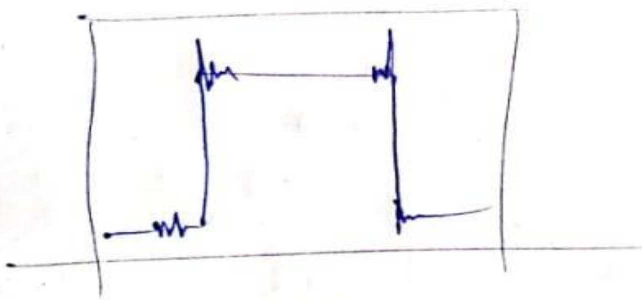
Fourier Series and gibbs phenomena (python)

$$f(x) \simeq \sum_{k=0}^{100} a_k \cos\left(k\frac{2\pi x}{L}\right) + b_k \sin\left(k\frac{2\pi x}{L}\right)$$

$$a_k = \langle f(x), \cos\left(k\frac{2\pi x}{L}\right)\rangle$$

$$b_k = \langle f(x), \sin\left(k\frac{2\pi x}{L}\right)\rangle$$

Python code



code (python code)

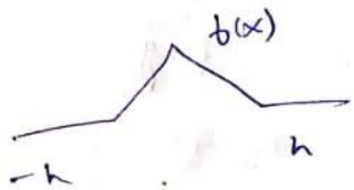
```
import numpy as np
import matplotlib.pyplot as plt
plt.rcParams['figure.figsize'] = [8, 8]
plt.rcParams.update({'font.size': 18})

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/h) * dx * 2/h
    BK = np.sum(f * np.sin(2*np.pi * K * x/h) * dx * 2/h
    fFS = fFS + AK * np.cos(2*K*np.pi * x/h)+BK*np.sin
    (2*K*np.pi * x/h)

plt.plot(x, f, color='K', linewidth=2)
plt.plot(x, fFS, '-', colors='r', linewidth=1.5)
plt.show()
```

Fourier Series



Fourier tranform

$$f(x) = \sum_{K=-\infty}^{\infty} C_K \, e^{iK\pi x/h}$$

$$C_K = \frac{1}{2h} \langle f(x), \psi_K \rangle = \frac{1}{2h} \int_{-h}^{h} f(x) \underbrace{e^{-iK\pi x/h}}_{\psi_K} dx$$

$$f(x) = \lim_{\substack{\Delta\omega \to 0 \\ (h \to \infty)}} \sum_{K=-\infty}^{\infty} \frac{\Delta\omega}{2\pi} \int_{-\pi/\Delta\omega}^{\pi/\Delta\omega} f(\xi) e^{-iK\Delta\omega\xi} d\xi \, e^{iK\Delta\omega x}$$

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

Property

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

$$f(x) = \mathcal{F}^{-1}(\hat{f}(\omega)) = \frac{1}{2\pi} \int_{-\infty}^{\infty} \hat{f}(\omega) e^{i\omega x} dx$$

The fourier tranform and convolution Integral

$$(f*g) = \int_{-\infty}^{\infty} f(x-\xi)\, g(\xi)\, d\xi$$

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

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

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

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

$$= f*g$$

The fourier

intution behind fourier and Laplace tranform

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

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

Laplace tranform : first order Equation

$$F(s) = \int_{0}^{\infty} f(t)\, e^{-st}\, dt$$

Laplace tranform: 1st order Equation the tranform of $f(t)$ and $y(t)$ are $F(s)$ and Y/s

$$f(t) = e^{at}\quad F(s) = \int_{0}^{\infty} f(t)\, e^{-st}\, dt = \left[\frac{e^{(a-s)t}}{a-s}\right]_{0}^{\infty} = 1/s-a = F(s)$$

$$\frac{dy}{dt} - ay = 0 \xrightarrow{LT} \int_0^\infty \frac{dy}{dt} e^{-st} dt = -\int_0^\infty y(t) (-s e^{-st} dt) + \left[y e^{-st} \right]_0^\infty$$

$$s(Y_s) - y(0) - a(Y_s) = 0$$

$$Y(s) = \frac{y(0)}{s-a} \xrightarrow[L.T]{\text{inv}} y(t) = y(0)$$

$$\boxed{y(t) = y(0) e^{at}}$$

$$\boxed{y(s) = \frac{1}{(s-c)(s-a)} + \frac{y(0)}{(s-a)}}$$

Laplace tranform and Inverse tranfer using matlab.

```
clc;
clearall;
syms h f t;
f= 5*t      => if f = exp(-5*t)
h= laplace (f)
```

F

```
clc;
clearall;
syms h f t a;
f= exp(-a*t) or f =(exp(-3*t)*sin(2*t))/t
h= Laplace (f)
```

Inverse Laplace

```
clc;
clearall;
syms F,x,s;
F = (s+29)/(s^3+4*s^2+9*s+36)
ilaplace (F,x)
```

Application of z-transform

difference Equation

model process

It is relation between the difference of an unknown function at one or more general vale

$$\Delta y_{n+1} + y_n = 2$$

$$\Delta y_{n+1} + \Delta^2 y_{n-1} = 1$$

are difference Equation

Example

$$u_{n+2} + 4u_{n+1} + 3u_n = 3^n \quad u_0 = 0,\ u_1 = 1$$

$$Z(u_{n+2}) + 4Z(u_{n+1}) + 3Z(u_n) = Z(3^n)$$

$$z^2\left[u(z) - u_0 - \frac{u_1}{z}\right] + 4z\left[u(z) - u_0\right] + 3u(z) = \frac{z}{z-3}, \ |z| > 3$$

$$z^2\left[u(z) - 0 - \tfrac{1}{z}\right] + 4z\left[u(z) - 0\right] + 3u(z) = \frac{z}{z-3}$$

$$(z^2 + 4z + 3) = \frac{z}{z-3} + z = \frac{z^2 - 2z}{z-3}$$

$$\text{then } \frac{u(z)}{z} = \frac{z-2}{(z-3)(z+1)(z+3)} = \frac{A}{(z-3)} + \frac{B}{(z+1)} + \frac{C}{(z+3)}$$

Hence

$$\frac{u(z)}{z} = \frac{1}{24(z-3)} + \frac{3}{8(z+1)} + \frac{5}{12(z+3)}$$

or

$$u(z) = \tfrac{1}{24}\frac{z}{(z-3)} + \tfrac{3}{8}\frac{z}{z+1} + \frac{5}{12}\frac{z}{(z+3)}$$

Here

$z^{-1}U(z)$

$= \frac{1}{24} z^{-1}\left(\frac{z}{z-3}\right) + \frac{3}{8} z^{-1}\left(\frac{z}{z+1}\right) + \frac{5}{12} z^{-1}\left(\frac{z}{z+3}\right)$

$= \frac{1}{24}(3^n) + \frac{3}{8}(-1)^n + \frac{5}{12}(-3)^n \quad |z| > 3$

thus $u_n = \frac{1}{24} 3^n + \frac{3}{8}(-1)^n + \frac{5}{12}(-3)^n \quad |z| > 3$

How to calculate the z transform in matlab

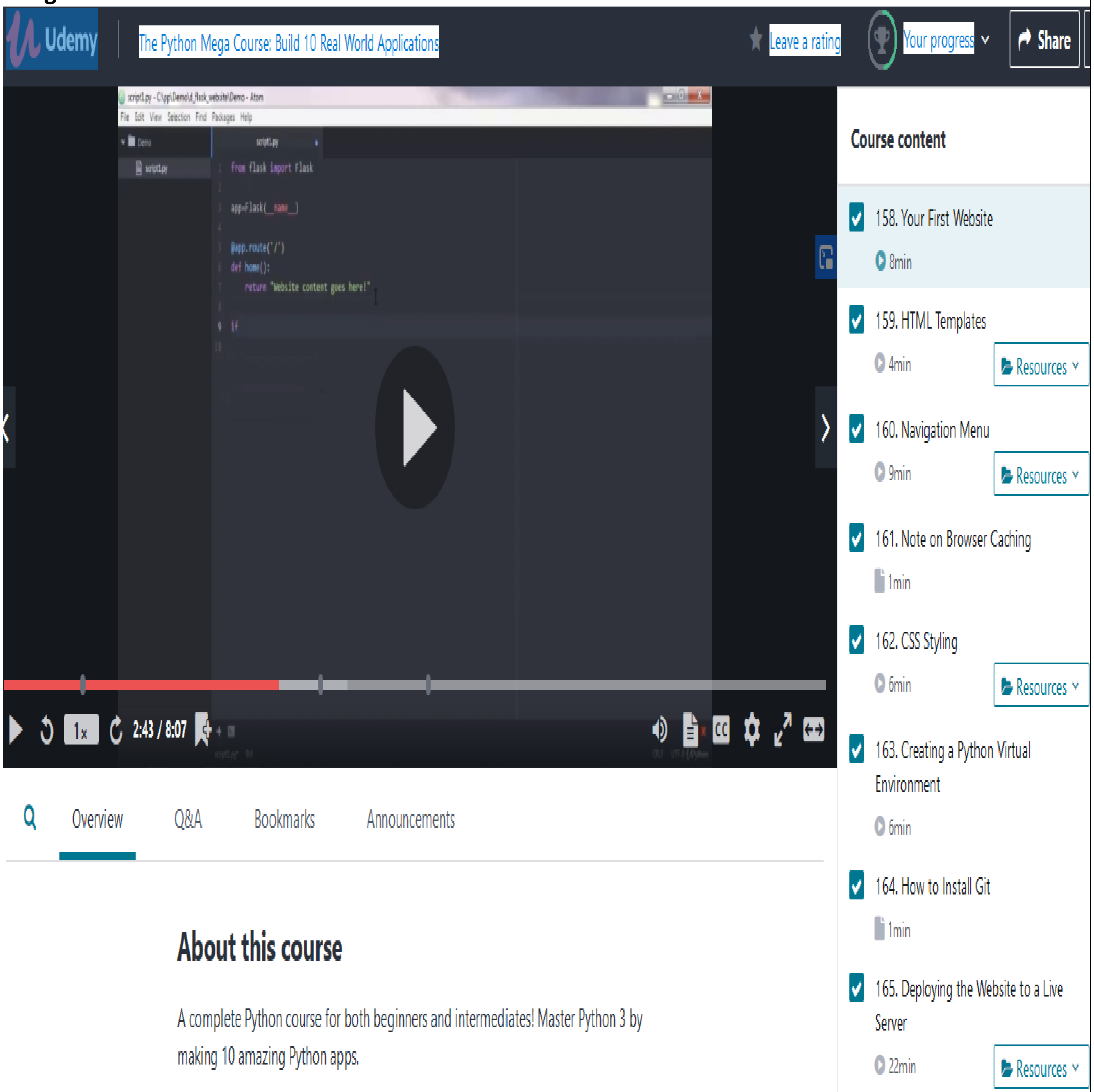
```
Syms n;
a = n+1;
b = ztrans(a);
disp(b)
pretty(b)
```

or

```
Syms n w,
a = sin(w*n);
b = ztrans(a);
disp(b)
Pretty(b)
```

Date:	**26 may 2020**	**Name:**	**nishanth**
Course:	**python**	**USN:**	**4al17ec063**
Topic:	**Application 4: Build a Personal Website with Python and Flask**	**Semester & Section:**	**6th & B**

Image of session



Report – Report can be typed or hand written for up to two pages.

Your first website:

Program:

```
from flask import flask.render_template
App=flask(__name__)
@app.route('/')
def home():
        return render_template("home.html")
@app.route('/about')
def about():
       return render_templates("about.html")
if_name_=="_+main__":
        app.run(debug=True)
```