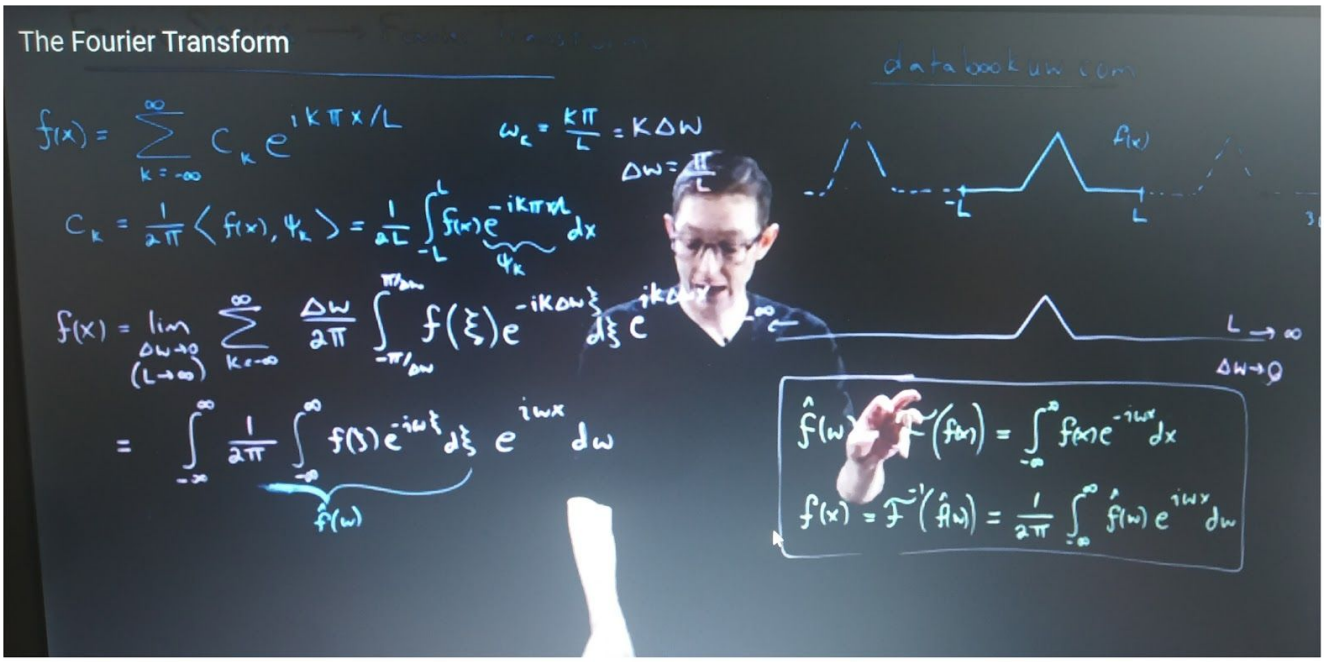
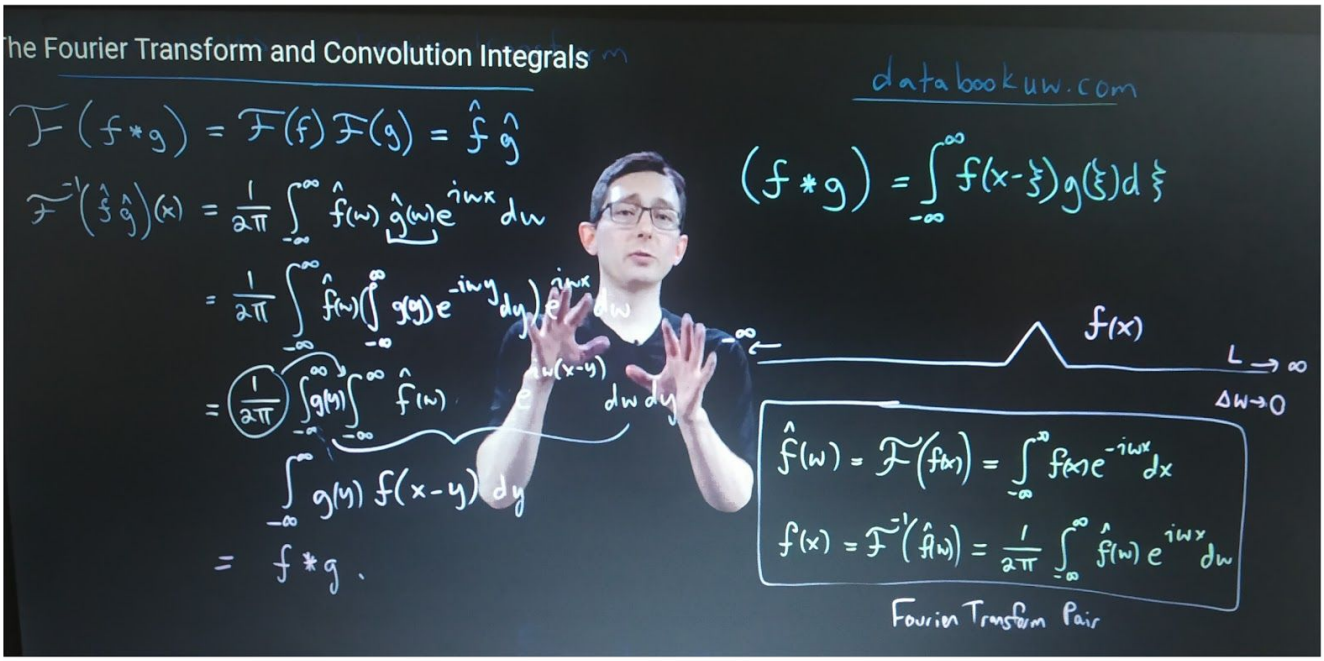
DAILY ASSESSMENT FORMAT

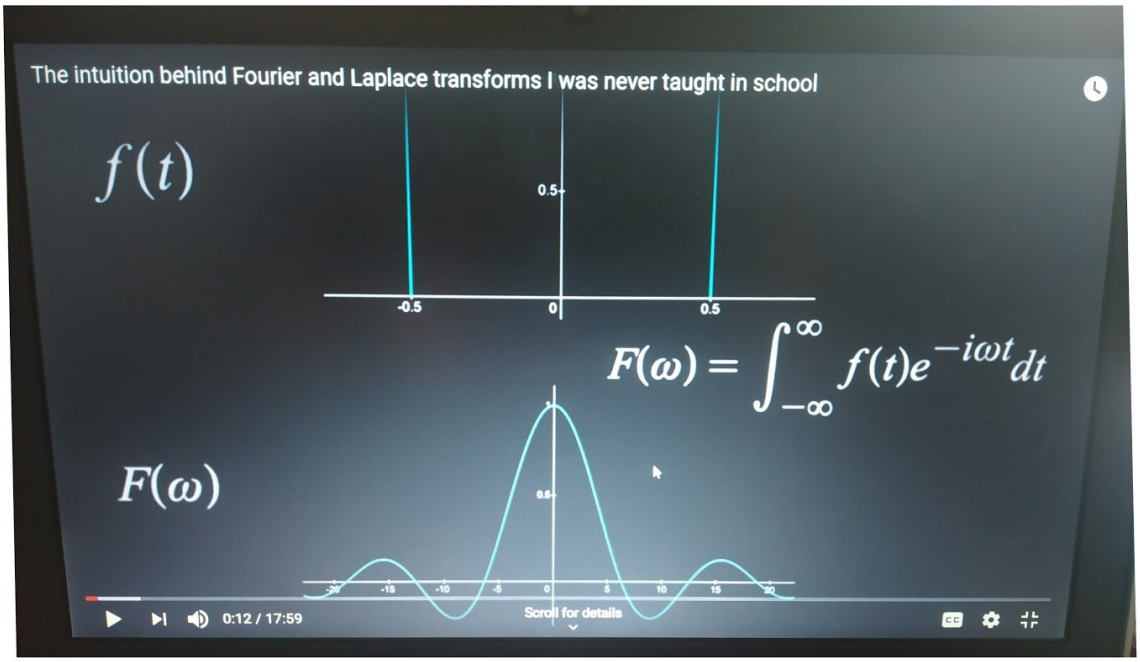
Date:	26-05-2020	Name:	MOUNITHA D M
Course:	Digital Signal Processing	USN:	4AL17EC055
Topic:	Fourier Transform,Fourier Series	Semester & Section:	6TH SEM "A" SEC
Github Repository:	Mounitha_-ec055		

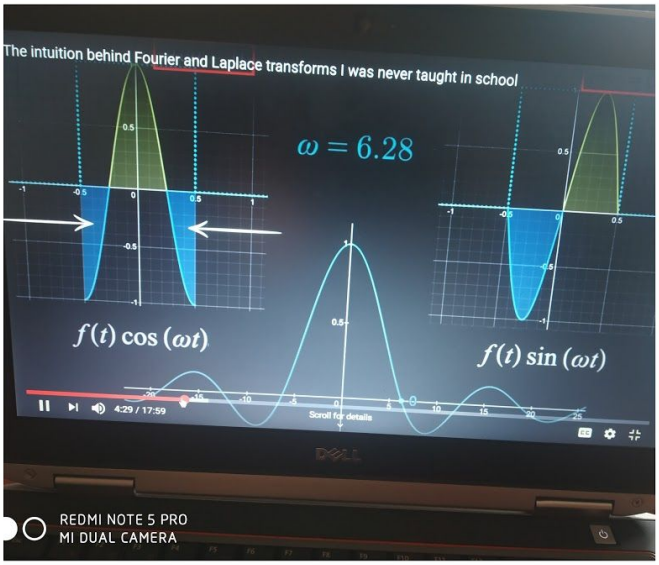
FORENOON SESSION DETAILS

Image of session






The intuition behind Fourier and Laplace transforms I was never taught in school
$f(t)$
$F(\omega) = \int_{-\infty}^{\infty} f(t)e^{-i\omega t}dt$
$F(\omega)$
0:12 / 17:59
Scroll for details


The intuition behind Fourier and Laplace transforms I was never taught in school
$\omega = 6.28$
$f(t)\cos(\omega t)$
$f(t)\sin(\omega t)$
4:29 / 17:59
Scroll for details
REDMI NOTE 5 PRO
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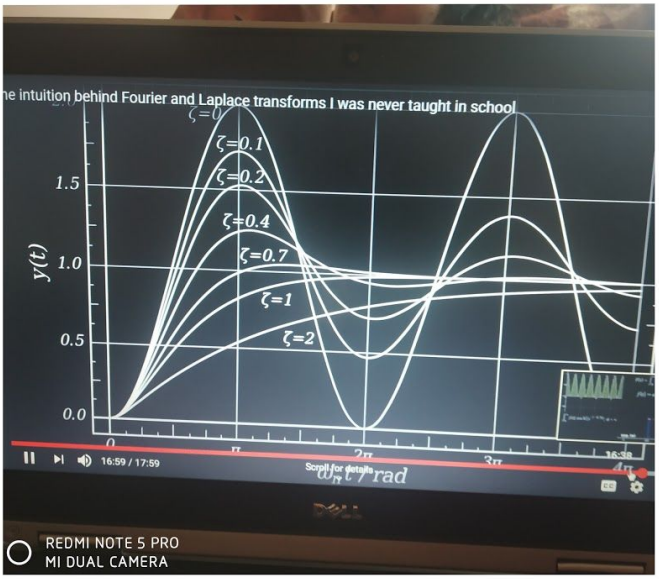
he intuition behind Fourier and Laplace transforms I was never taught in school
$\zeta=0$
$\zeta=0.1$
$\zeta=0.2$
$\zeta=0.4$
$\zeta=0.7$
$\zeta=1$
$\zeta=2$
$y(t)$
16:59 / 17:59
Scroll for details
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Lecture 46- Applications of Z- transform- II

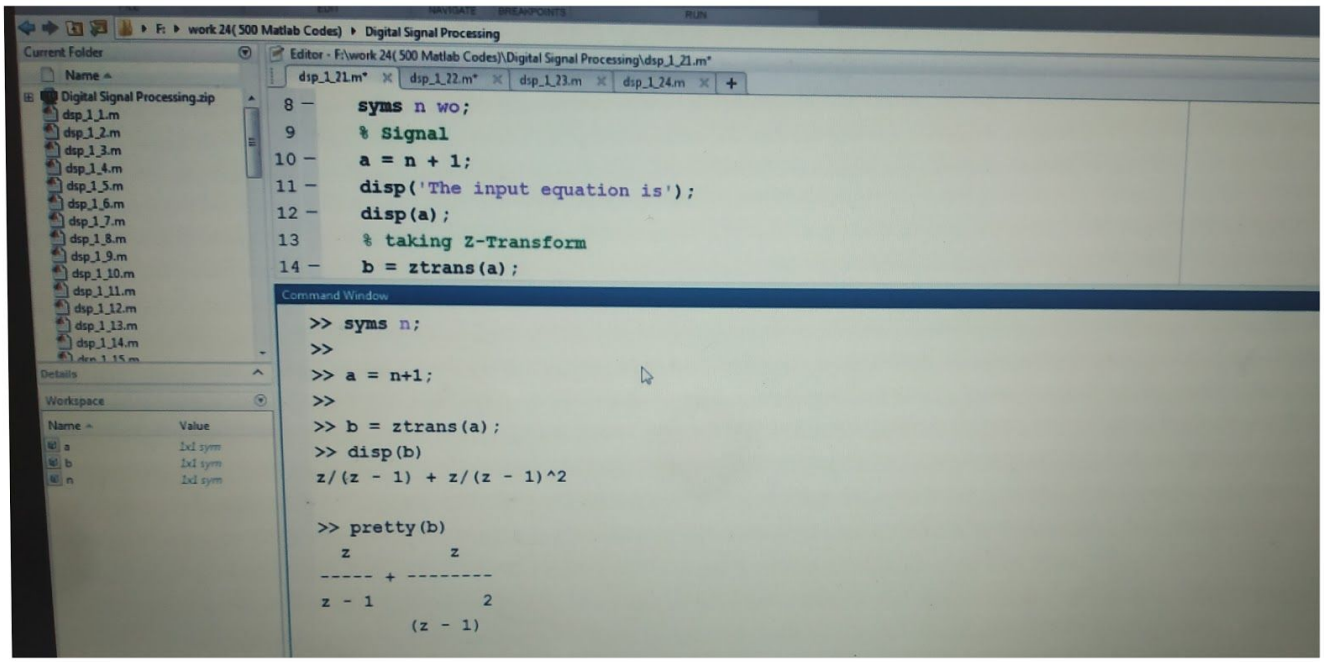
We know that $$Z(1) = \frac{z}{z-1}, \quad |z| > 1$$

$$Z(n) = \frac{z}{(z-1)^2}, \qquad Z(n^2) = \frac{z^2+z}{(z-1)^3}.$$

Hence

$$Z(n^3) = -z\frac{d}{dz}Z(n^2)$$

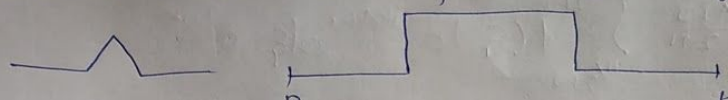
$$= \frac{z^3+4z^2+z}{(z-1)^4}.$$



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

(1) DSP → Day2 26/5/2020

Fourier Series Gibbs phenomena using python



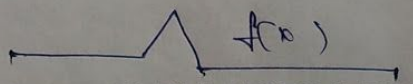
$$f(x) \cong \sum_{k=0}^{100} a_k \cos\left(\frac{2\pi x}{L}\right) + b_k \sin\left(k\frac{2\pi x}{L}\right)$$

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

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

```
import numpy as np
import matplotlib.pyplot as plt
plt.rcParams['figure.figsize'] = [0.5]
plt.rcParams.update({'font.size':10})
dx = 0.0;
L = 2*np.pi
x = np.arange(0.2*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,ffs,'--',color='r',linewidth=1.5)
plt.show()
```

Fourier Transform



$$f(x) = \sum_{k=-\infty}^{\infty} C_k e^{ik\pi x/L}$$

$$C_k = \frac{1}{2\pi} f(x)\psi_k \Rightarrow \frac{1}{2L}\int_{-L}^{L} f(x) e^{-jk\pi x/L}\, dx$$

$\omega_k = k\pi/L = k\Delta\omega \qquad \Delta\omega = \pi/L$

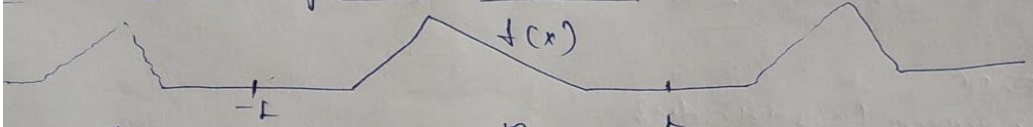
$$f(x) = \lim_{\substack{\Delta\omega \to 0 \\ (L \to \infty)}} \sum_{k=-\infty}^{\infty} \frac{\Delta\omega}{2\pi} \int_{-\pi/2\omega}^{\pi/2\omega} f(\xi) e^{-jk\Delta\omega} d\xi \; e^{jk\omega x}$$

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

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

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

Fourier Transform Derivatives



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

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

$$F\left(\frac{d}{dx} f(x)\right) = \int_{-\infty}^{\infty} \underbrace{\frac{df}{dx}}_{dv} \underbrace{e^{-j\omega x}}_{u} dx$$

$$= \underbrace{\left[f(x) e^{-j\omega x}\right]_{-\infty}^{\infty}}_{uv = 0} - \int_{-\infty}^{\infty} \underbrace{f(x)}_{v} \underbrace{(-\omega e^{-j\omega x})}_{du} dx$$

$$= \underbrace{j\omega \int_{-\infty}^{\infty} f(x) e^{-j\omega x} dx}_{F(f(x))} = \underbrace{j\omega F(f(x))}_{F(df/dx)}$$

$$u_t = c u_{xx} \xrightarrow{\mathcal{F}} \hat{u}_t = -\omega^2 \hat{u}$$

(PDE) (ODE)

$$u(x,t) \xrightarrow{\mathcal{F}} \hat{u}(\omega, t)$$

Fourier Transform and convolution

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

$f(x)$ $\xrightarrow{L}$ $-\infty$ $\quad \hat{f}(\omega) = F(f(x)) = \int_{-\infty}^{\infty} f(x)\, e^{-i\omega x}\, dx$

$\Delta\omega \to 0$ $\quad f(x) = F^{-1}(\hat{f}(\omega)) = \frac{1}{2\pi} \int_{-\infty}^{\infty} \hat{f}(\omega)$

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

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

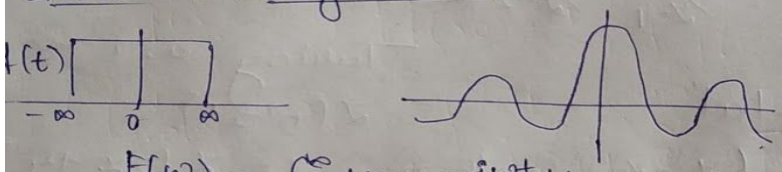
$$= \frac{1}{2\pi} \int_{-\infty}^{\infty} \hat{f}(\omega) \left(\int_{-\infty}^{\infty} g(y)\, e^{-i\omega y}\, dy \right) e^{i\omega x}\, d\omega$$

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

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

$$= f * g.$$

Intuition of Fourier



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

$$e^{-i\omega t} = \cos(-\omega t) + i \sin(\omega t)$$

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

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

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

Laplace : $f(s) = \int_{0}^{\infty} f(t)\, e^{-(\alpha + i\omega)t}\, dt$

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

Implementation of Laplace Transform using MATLAB

```
clc
clear all;
Sym F S x;
F = (S+29)/(S^3+4*S^2+9*S+36)
Laplace(F,X)
```

→ F =

```
(S+29)/(S^3 + 4*S^2+ 9*S+36)
```

ans ⇒ `Exp(-4*X) -cos(3*x) +(5*Sin(3*x)3/2`

Application of Z transforms

$$Z^{-1}\left(\frac{Z^3-20Z}{(Z-2)^3(Z-4)}\right) = -\frac{1}{2}4^n + \frac{1}{2}2^n + n^2 2^n$$

$$\frac{Z^2-20}{(Z-2)^3(Z-4)} = \frac{U(Z)}{Z} = \frac{A}{Z-4} + \frac{B}{Z-2} + \frac{C}{(Z-2)^2} + \frac{D(2Z+4)}{(Z-2)^3}$$

Taking $a=2$ we get $Z(n^2 2^n)$

$Z(na^n) = \frac{aZ}{(Z-a)^2}$ $|Z|>|a|$

$A = \left(\frac{Z^2-20}{(Z-2)^3}\right) = \frac{16-20}{8} = -\frac{1}{2}$ $\quad Z\frac{(2Z+4)}{(Z-2)^3}$

$Z(n2^n) = \frac{2Z}{(Z-2)^2}$.

We have $Z(n^2a^n) = \frac{aZ^2+a^2Z}{(Z-a)^3} = \frac{Z(aZ+a^2)}{(Z-a)^3}$.

$Z^2-20 = A(Z-2)^3 + B(Z-2)^2(Z-4) + C(Z-2)(Z-4) + D(2Z+4)(Z-4)$ ①

Putting $Z=2$, we get $-16 = D(8)(-2) \Rightarrow D=1$

Putting $Z=0$ in Eqn ①

$-20 = -8A - 16B + 8C - 16D$

$-20 = -8(-\frac{1}{2}) - 16(\frac{1}{2}) + 8C - 16$

or $-20 = 4 + 8 + 8C - 16$ Hence $\frac{U(Z)}{Z} = -\frac{1}{2(Z-4)} + \frac{1}{2(Z-2)} + \frac{(2Z+4)}{(Z-2)^3}$

$\Rightarrow C = 0$

$U(z) = -\frac{1}{2}\frac{z}{z-1} + \frac{1}{2}\frac{z}{z-0} + \frac{2z^2+5z}{(z-2)3}$

$U_n = -\frac{1}{2}4^n + \frac{1}{2}\cdot 2^n + n^2 2^n \quad |z| > 4$

Find the Z transform of sequence using Matlo

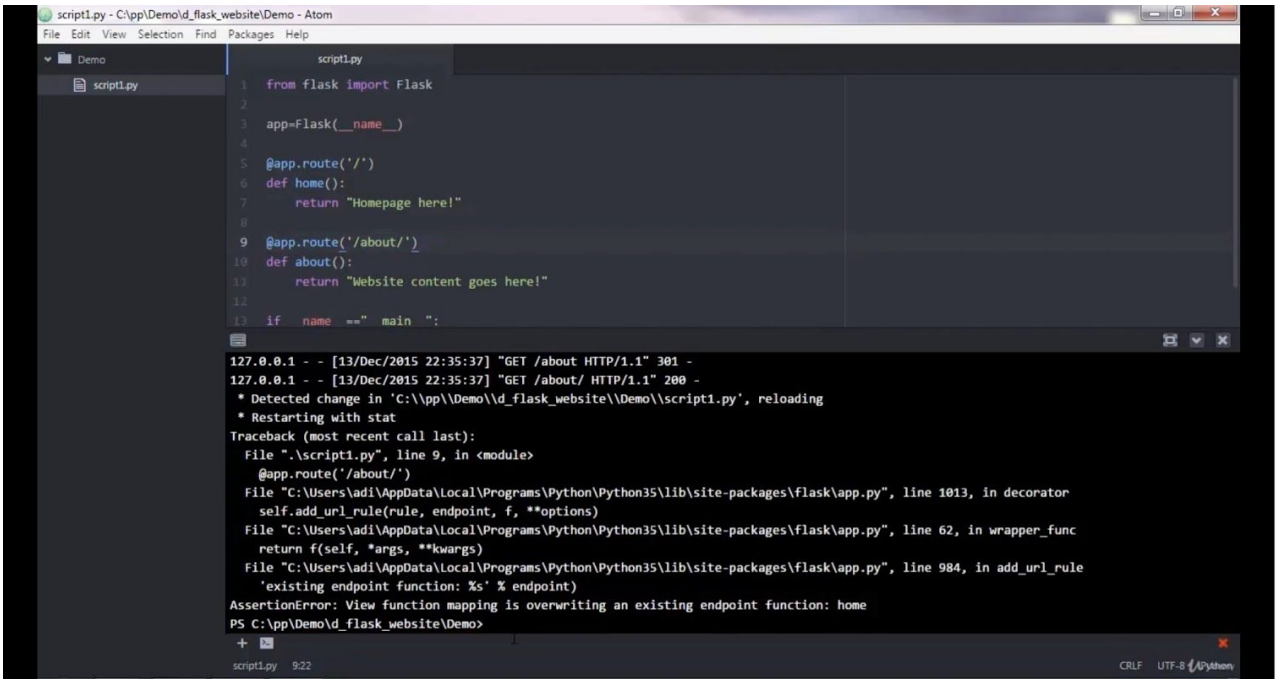
```
>> syms n;
>> a = n+t;
>> b = ztrans(a);
>> disp(b)
z/(z-1) + z/(z-1)^2
>> pretty(b)
   z        z
------ + ------
 z - 1          2
(z - 1)
```

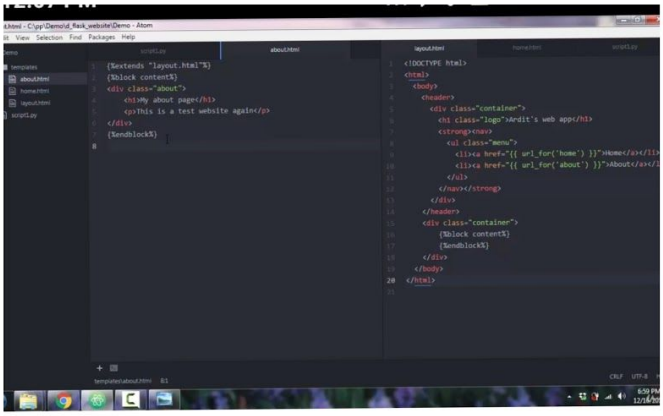
```
a = sin(w*n);
b = ztrans(a);
disp(b)
(z*sin(w))/(z^2 - 2*cos(w)*z + 1)
>> pretty(b)
     z sin(w)
-------------------
 2
z  - cos(w) z + 1
```

DATE	**26-05-2020**	**Name:**	**MOUNITHA DM**
Course:	**PYTHON**	**USN:**	**4AL17EC055**
Topic:	**Application 4:Build a Personal website with Python and Flask**	**Semester & Section:**	**6TH SEM "A" SEC**

AFTERNOON SESSION DETAILS

Image of session





Lectures More

156 Scheduling a Python Program on a Server
Article

Section 20 - Application 4: Build a Personal Website wit...

157 Personal Website - How The Outp...
Video - 01:42 mins - Resources (1)

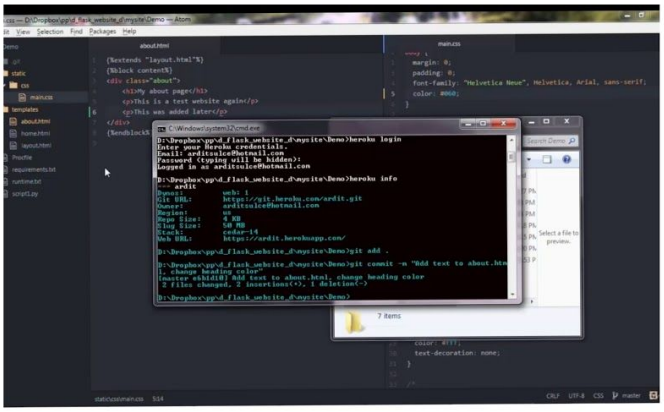
158 Your First Website
Video - 08:07 mins

159 HTML Templates
Video - 04:09 mins - Resources (2)

160 Navigation Menu
Video - 08:32 mins - Resources (3)

161 Note on Browser Caching
Article

162 CSS Styling



Lectures More

Video - 08:32 mins - Resources (3)

161 Note on Browser Caching
Article

162 CSS Styling
Video - 05:59 mins - Resources (1)

163 Creating a Python Virtual Environ...
Video - 06:22 mins

164 How to Install Git
Article

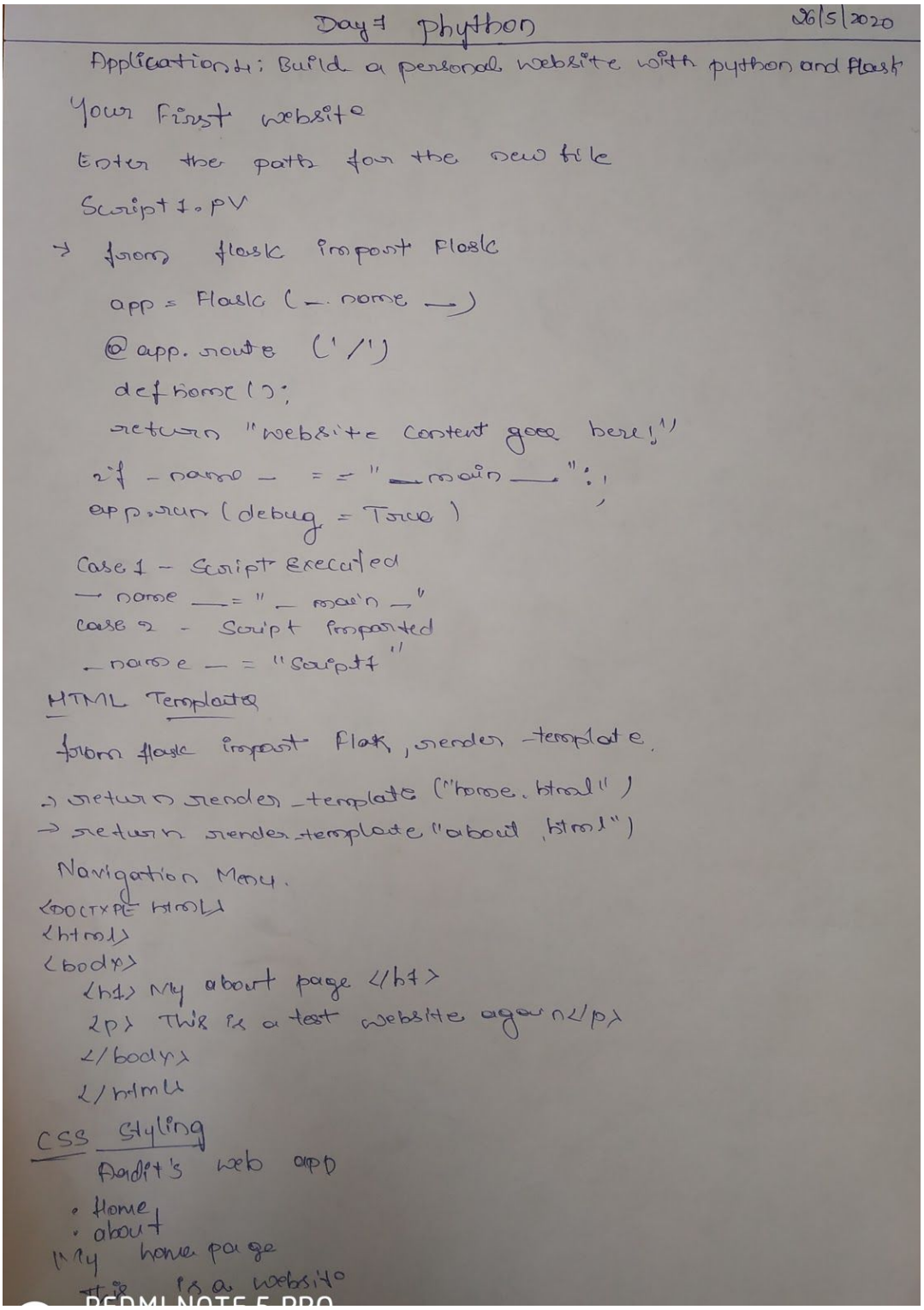
165 Deploying the Website to a Live S...
Video - 22:06 mins - Resources (2)

166 Maintaining the Live Website
Video - 07:26 mins

167 Troubleshooting
Article

168 Congratulations!

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



Day 1 Phython 26/5/2020

Application 1: Build a personal website with python and Flask

Your First website

Enter the path for the new file

Script1.pY

→ from flask import Flask

app = Flask (__name__)

@app.route ('/')

def home():

return "website content goes here!"

if __name__ == "__main__":

app.run (debug = True)

Case 1 - Script Executed

__name__ = "__main__"

case 2 - Script Imported

__name__ = "Script1"

HTML Templates

from flask import Flask, render_template.

→ return render_template ("home.html")

→ return render_template ("about.html")

Navigation Menu.

<!DOCTYPE html>

<html>

<body>

<h1> My about page </h1>

 This is a test website again

</body>

</html>

CSS Styling

Aadit's web app

- Home
- about

My home page

This is a website

Deploying the website to a Live Server

```
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_template ("about.html")
    if __name__ == "__main__":
    app.run (debug = True)
```

Maintaining the live website

```
{%. Extends "layout.html" %}
{% block content %}
<div class = "about">
<h1> My about page </h1>
<p> This is a test website again </p>
<p> This was added later </p>
</div>.
```

D:\Dropbox\ppld-flask-website-d\mysite\Demos> git add

D:\Dropbox\ppld-flask-website-d\mysite\Demos> git commit

-m "add text to about.html

1. change heading colour"

8. file changed, 2 insertions (+), 2 deletion (-)

D:\Dropbox\ppld-flask-website-d\mysite\Demos