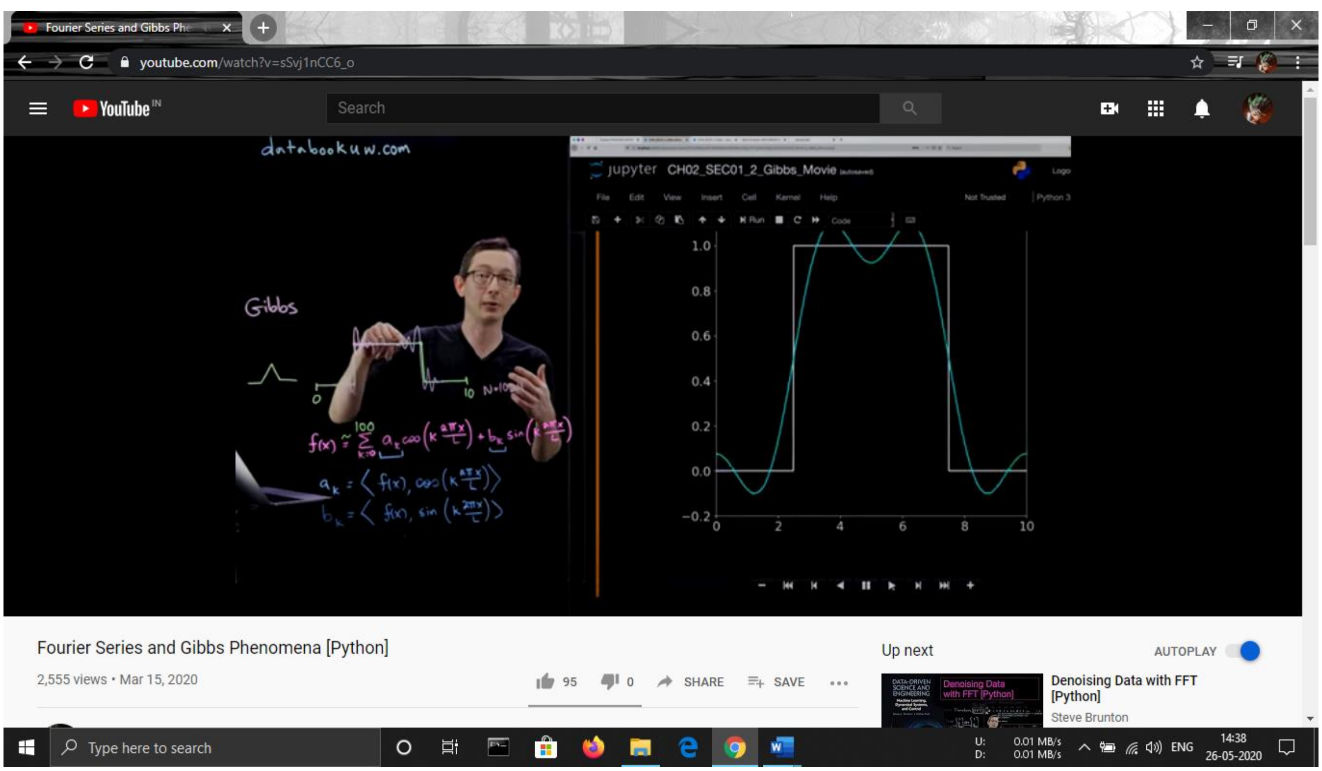
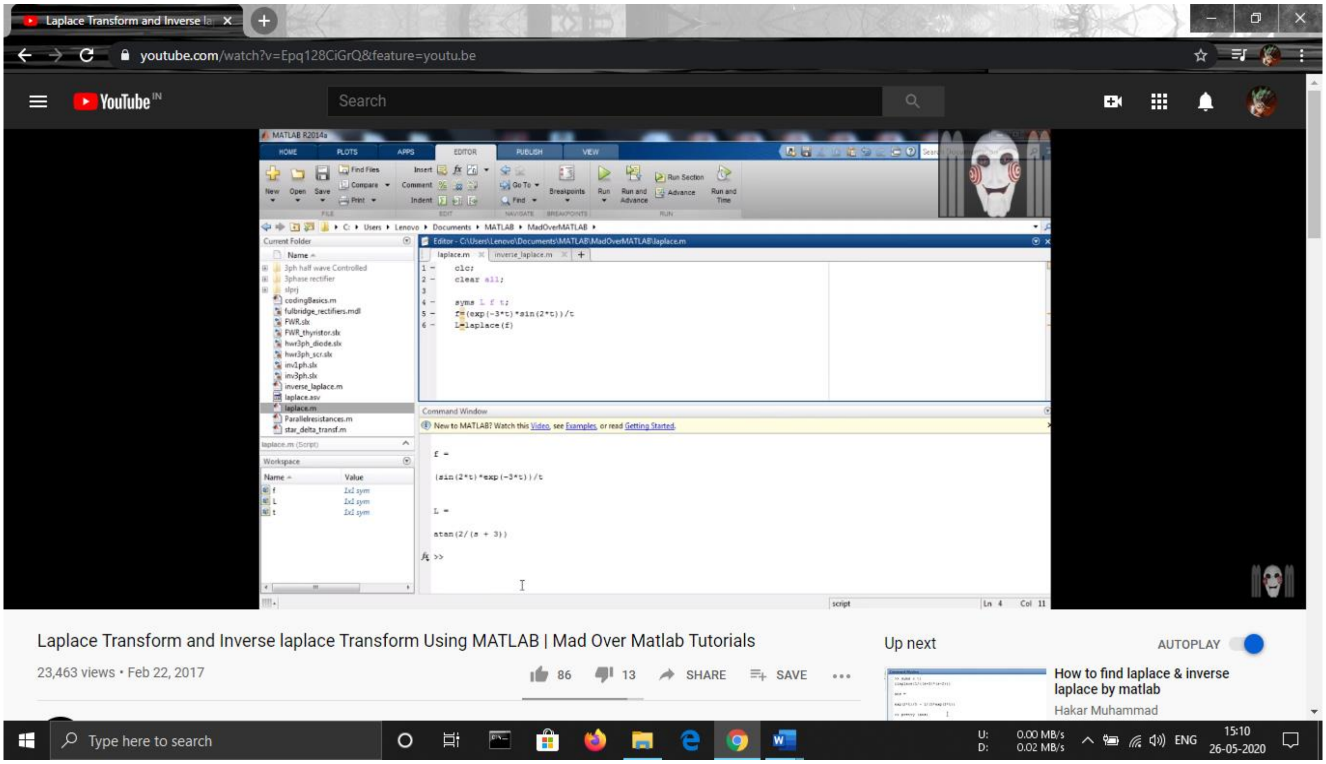
DAILY ASSESSMENT REPORT

Date:	**26/05/2020**	**Name:**	**Abhishek M Shastry K**
Subject:	**Digital Signal Processing**	**USN:**	**4AL17EC002**
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:**	**6th 'A'**
Github Repository:	**AbhishekShastry-Courses**		

FORENOON SESSION DETAILS
Image of session




Laplace Transform and Inverse la
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clc;
clear all;
syms L f t;
f=(exp(-3*t)*sin(2*t))/t
L=laplace(f)
f =
(sin(2*t)*exp(-3*t))/t
L =
atan(2/(s + 3))
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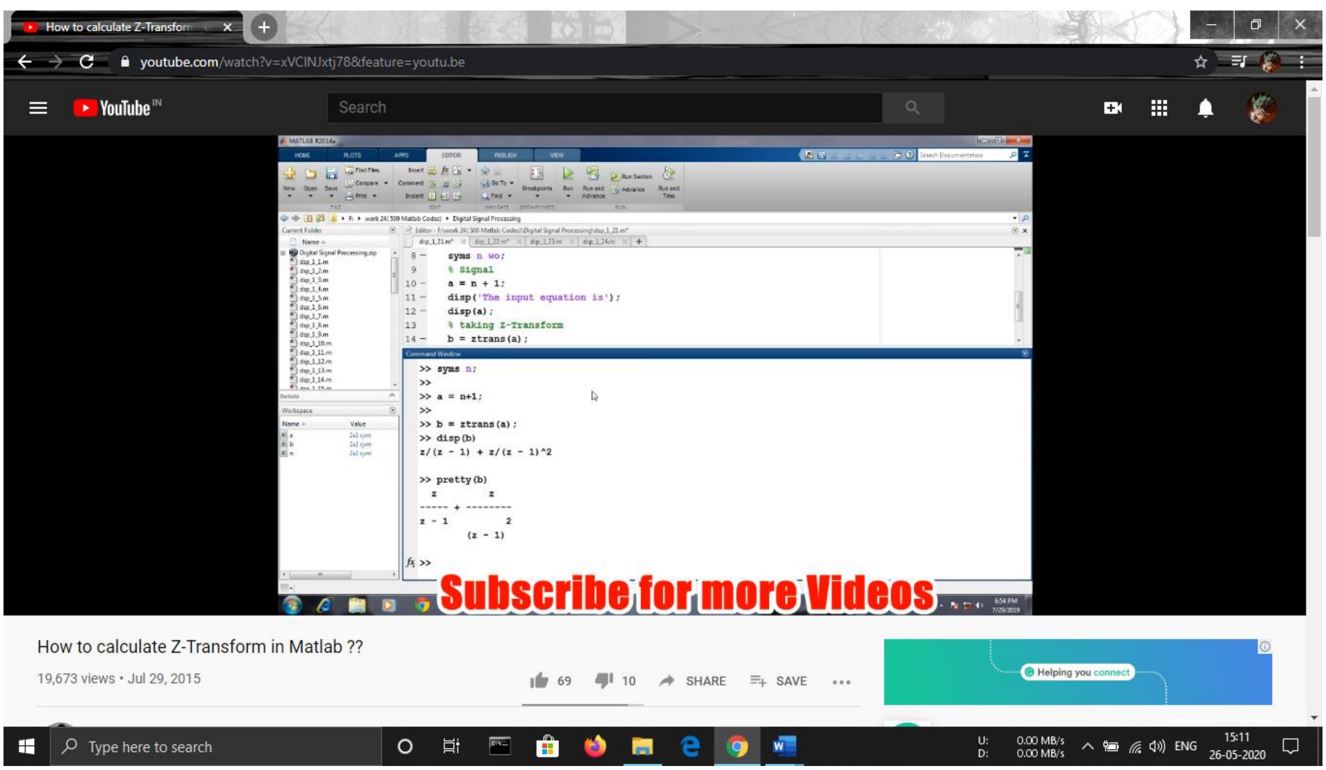
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syms n wo;
% Signal
a = n + 1;
disp('The input equation is');
disp(a);
% taking Z-Transform
b = ztrans(a);
>> syms n;
>> a = n+1;
>> b = ztrans(a);
>> disp(b)
z/(z - 1) + z/(z - 1)^2
>> pretty(b)
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Report

Derivatives of functions

The Fourier transform of the derivative of a function is given by:

$$
\begin{aligned}
\mathcal{F}\left(\frac{d}{dx}f(x)\right) &= \int_{-\infty}^{\infty} \overbrace{f'(x)}^{dv}\,\overbrace{e^{-i\omega x}}^{u}\,dx \\
&= \Big[\underbrace{f(x)e^{-i\omega x}}_{uv}\Big]_{-\infty}^{\infty} - \int_{-\infty}^{\infty} \underbrace{f(x)}_{v}\Big[\underbrace{-i\omega e^{-i\omega x}}_{du}\Big]\,dx \\
&= i\omega\int_{-\infty}^{\infty} f(x)e^{-i\omega x}\,dx \\
&= i\omega\mathcal{F}(f(x)).
\end{aligned}
$$

- This is an extremely important property of the Fourier transform, as it will allow us to turn PDEs into ODEs, closely related to the separation of variables:

$$
\underset{\text{(PDE)}}{u_{tt} = c u_{xx}} \quad \stackrel{\mathcal{F}}{\Longrightarrow} \quad \underset{\text{(ODE)}}{\hat{u}_{tt} = -c\omega^2\hat{u}.}
$$

Linearity of Fourier transforms

The Fourier transform is a linear operator, so that:

$$\mathcal{F}(\alpha f(x) + \beta g(x)) = \alpha\mathcal{F}(f) + \beta\mathcal{F}(g).$$

$$\mathcal{F}^{-1}(\alpha\hat{f}(\omega) + \beta\hat{g}(\omega)) = \alpha\mathcal{F}^{-1}(\hat{f}) + \beta\mathcal{F}^{-1}(\hat{g}).$$

Parseval’s theorem

$$\int_{-\infty}^{\infty} |\hat{f}(\omega)|^2\,d\omega = 2\pi\int_{-\infty}^{\infty} |f(x)|^2\,dx.$$

Convolution

The convolution of two functions is particularly well-behaved in the Fourier domain, being the product of the two Fourier transformed functions. Define the convolution of two functions f(x) and g(x) as f * g:

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

If we let ^f = F(f) and ^g = F(g), then:

$$\begin{aligned}
\mathcal{F}^{-1}\left(\hat{f}\hat{g}\right)(x) &= \frac{1}{2\pi}\int_{-\infty}^{\infty} \hat{f}(\omega)\hat{g}(\omega)e^{i\omega x}\, d\omega \\
&= \int_{-\infty}^{\infty} \hat{f}(\omega)e^{i\omega x}\left(\frac{1}{2\pi}\int_{-\infty}^{\infty} g(y)e^{-i\omega y}\, dy\right) d\omega \\
&= \frac{1}{2\pi}\int_{-\infty}^{\infty}\int_{-\infty}^{\infty} g(y)\hat{f}(\omega)e^{i\omega(x-y)}\, d\omega\, dy \\
&= \int_{-\infty}^{\infty} g(y)\underbrace{\left(\frac{1}{2\pi}\int_{-\infty}^{\infty} \hat{f}(\omega)e^{i\omega(x-y)}\, d\omega\right)}_{f(x-y)} dy \\
&= \int_{-\infty}^{\infty} g(y)f(x-y)\, dy = g * f = f * g.
\end{aligned}$$

Laplace Transform

Laplace transform of a signal (function) f is the function F = L(f) defined by:

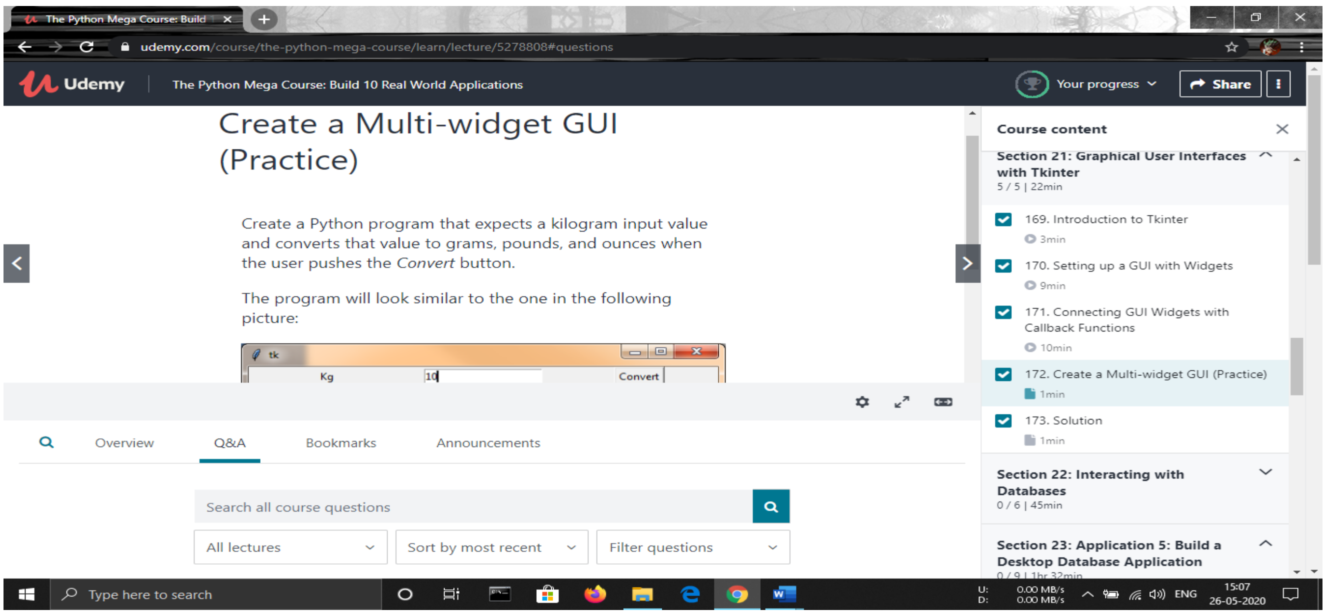
$$F(s) = \int_{0}^{\infty} f(t)e^{-st}\, dt$$

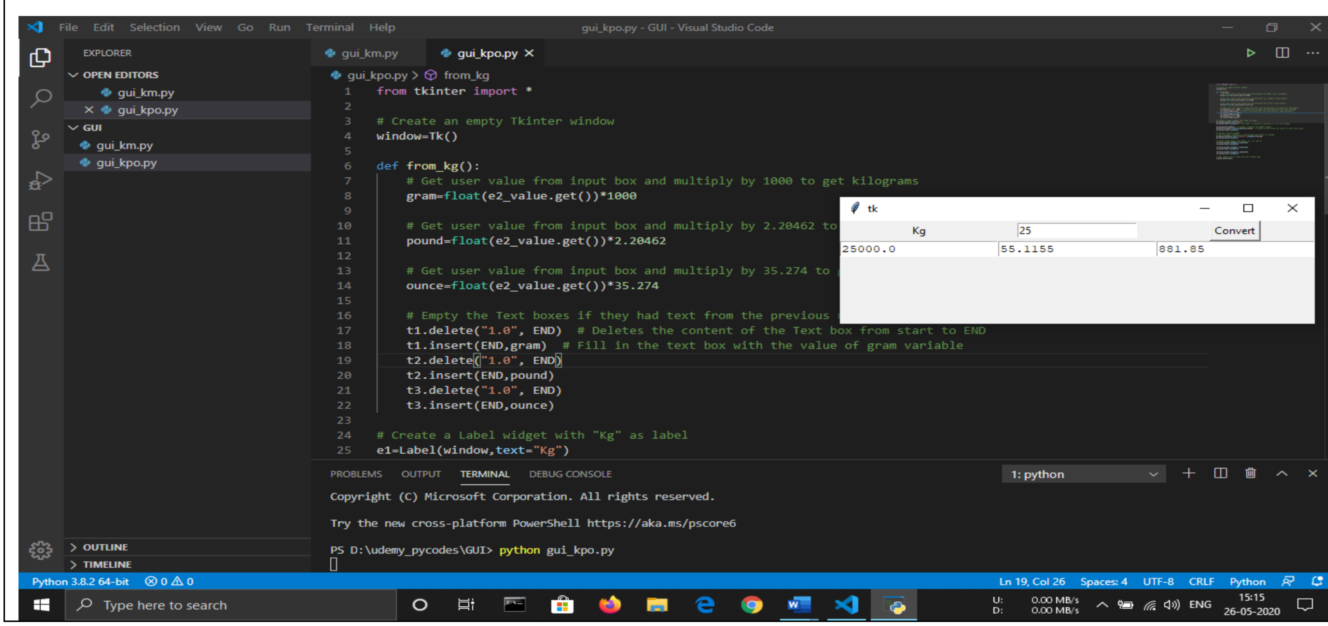
For those s ∈ C for which the integral makes sense.

- F is a complex-valued function of complex numbers.
- s is called the (complex) frequency variable, with units sec^{-1}.
- t is called the time variable (in sec).
- Assume f contains no impulses at t = 0.

Date:	**26/05/2020**	**Name:**	**Abhishek M Shastry K**
Course:	**The Python Mega Course: Build 10 Real World Applications**	**USN:**	**4AL17EC002**
Topic:	**1] Graphical User Interfaces with Tkinter**	**Semester & Section:**	**6th 'A'**
Github Repository:	**AbhishekShastry-Courses**		

AFTERNOON SESSION DETAILS
Image of session





Report

Graphical User Interfaces with Tkinter

- The graphical user interface is a form of user interface that allows users to interact with electronic devices through graphical icons and audio indicator such as primary notation, instead of text-based user interfaces, typed command labels or text navigation.
- **Tkinter** is the standard GUI library for Python. Python when combined with Tkinter provides a fast and easy way to create GUI applications. Tkinter provides a powerful object-oriented interface to the Tk GUI toolkit.
- The two main elements of GUI are **Window** and **Widgets**.
- A window is an area on the screen that displays information, with its contents being displayed independently from the rest of the screen.
- Interface elements known as **graphical control elements**, **controls** or **widgets** are software components that a computer user interacts with through direct manipulation to read or edit information about an application. Each widget facilitates a specific user-computer interaction.
- The **Tk ()** function is used to create a GUI window.
- The **mainloop ()** function is used to keep GUI window open until user closes window mandatorily.
- To create widgets:
  - ✓ The **Button ()** function is used to implement various kinds of buttons. Buttons can contain text or images, and you can associate a Python function or method with each button. When the button is pressed, Tkinter automatically calls that function or method.
  - ✓ The **Entry ()** function is used to accept single-line text strings from a user.
  - ✓ The **text ()** function is used to display text documents, containing either plain text or formatted text (using different fonts, embedded images, and other embellishments). The text widget can also be used as a text editor.