MIT-WPU

Dr. Vishwanath Karad
MIT WORLD PEACE UNIVERSITY PUNE

S. Y. B. Tech. (Electrical and Computer Engineering)

Semester: IV **Subject: Electrical Circuit Analysis**

Name: Shreerang Mhatre **Class:**

Roll No: 33 → RRN - 1032211745 **Batch:** A2

Experiment No: 02

Name of the Experiment: Generation of various signals (sine, square, ramp, triangular) using MATLAB

Performed on: 9/8/2022

Submitted on: 6/9/2022

Marks	Teacher's Signature with Date
19/20	6-9-22

Aim: Generation of various signals (sine, square, ramp, triangular) using MATLAB

Prerequisite: Knowledge of waveforms equations.

Theory:

If the amplitude of the signal is defined at every instant of time then it is called continuous time signal. If the amplitude of the signal is defined at only at some instants of time then it is called discrete time signal. If the signal repeats itself at regular intervals then it is called periodic signal. Otherwise they are called aperiodic signals.

Sine wave, also known as a sinusoidal wave, is a mathematical expression that represents a repetitive oscillation. It is a function of time. MATLAB supports generating sin waves using the 2D plot function.

```
clear;
clc;
close;
f=60; %frequency [Hz]
t=(0:1/(f*100):1);
a=1;    %amplitude [V]
phi=0;  %phase
y=a*sin(2*pi*f*t+phi);
plot(t,y)
xlabel('time(s)')
ylabel('amplitude(V)')
```

Similarly you can plot for other types of waveforms.

Functions:

1. plot(X,Y) creates a 2-D line plot of the data in Y versus the corresponding values in X.

   To plot a set of coordinates connected by line segments, specify X and Y as vectors of the same length.

   To plot multiple sets of coordinates on the same set of axes, specify at least one of X or Y as a matrix.
2. sine = dsp. SineWave creates a sine wave object that generates a real-valued sinusoid with an amplitude of 1, a frequency of 100 Hz, and a phase offset of 0. By default, the sine wave object generates only one sample. sine = dsp.
3. x = square(t) generates a square wave with period 2π for the elements of the time array t . square is similar to the sine function but creates a square wave with values of −1 and 1.
4. x = sawtooth(t) generates a sawtooth wave with period 2π for the elements of the time array t. sawtooth is similar to the sine function but creates a sawtooth wave with peaks of −1 and 1. The sawtooth wave is defined to be −1 at multiples of 2π and to increase linearly with time with a slope of $1/\pi$ at all other times.

Procedure:

1. Open MATLAB
2. Open new M-file
3. Type the program
4. Save in current directory
5. Compile and Run the program
6. For the output see command window\ Figure window

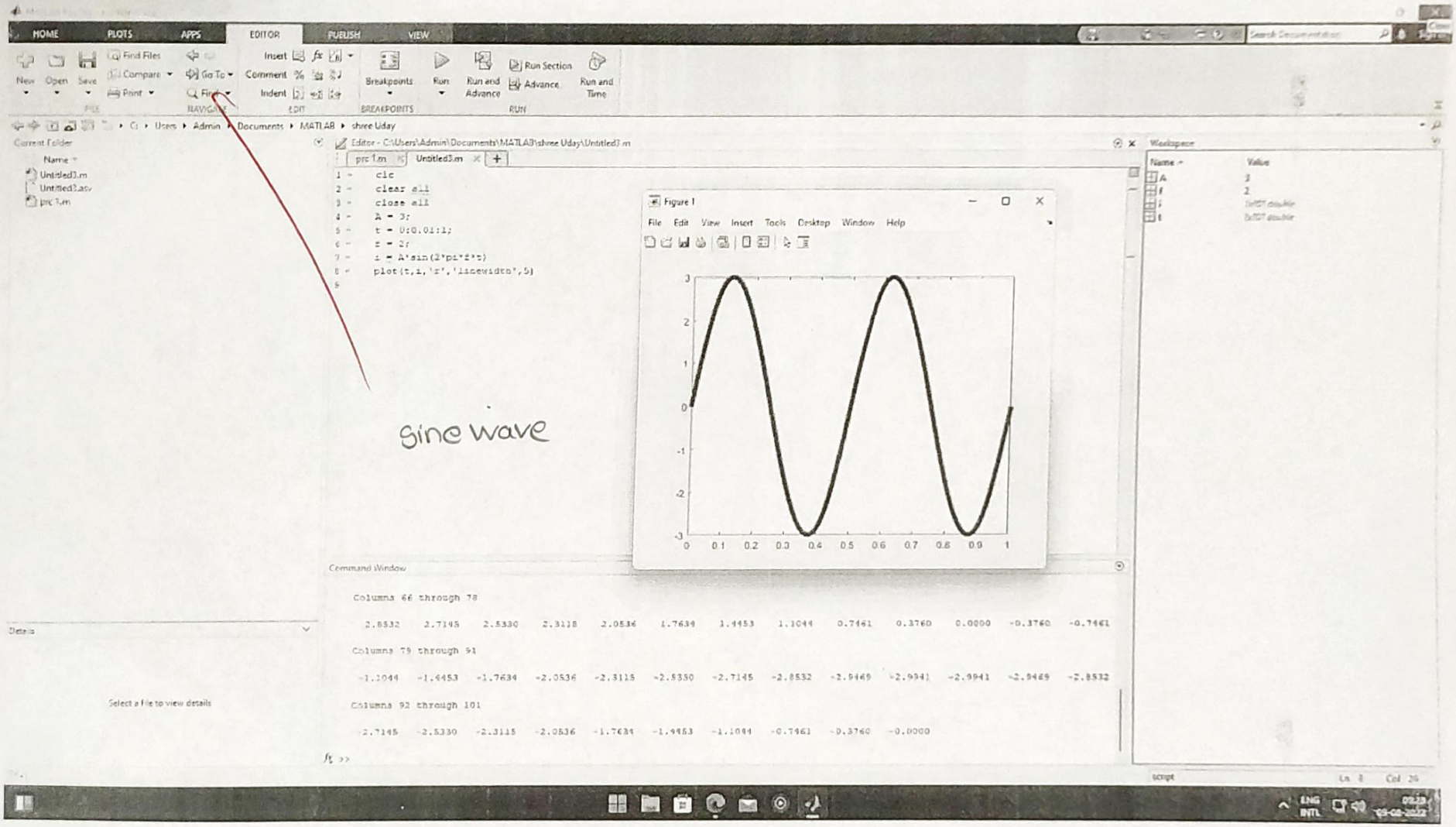
Activity:

Create following waveforms:

1. Sine wave
2. Square wave
3. Triangular wave
4. Ramp
5. Impulse

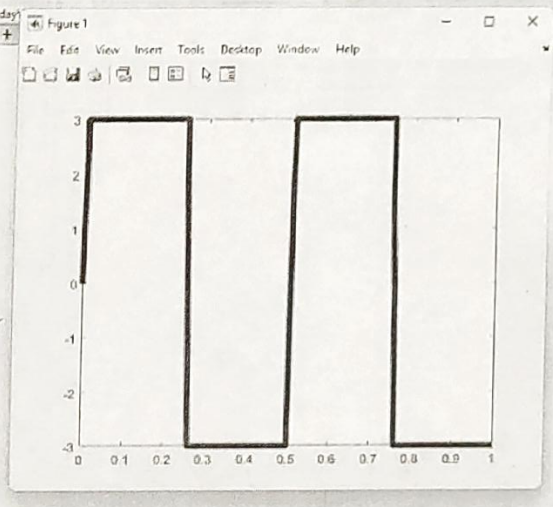
Post Lab Questions:

1. Define signal.
2. Define continuous and discrete signal.
3. Differentiate between sawtooth and triangular signal.

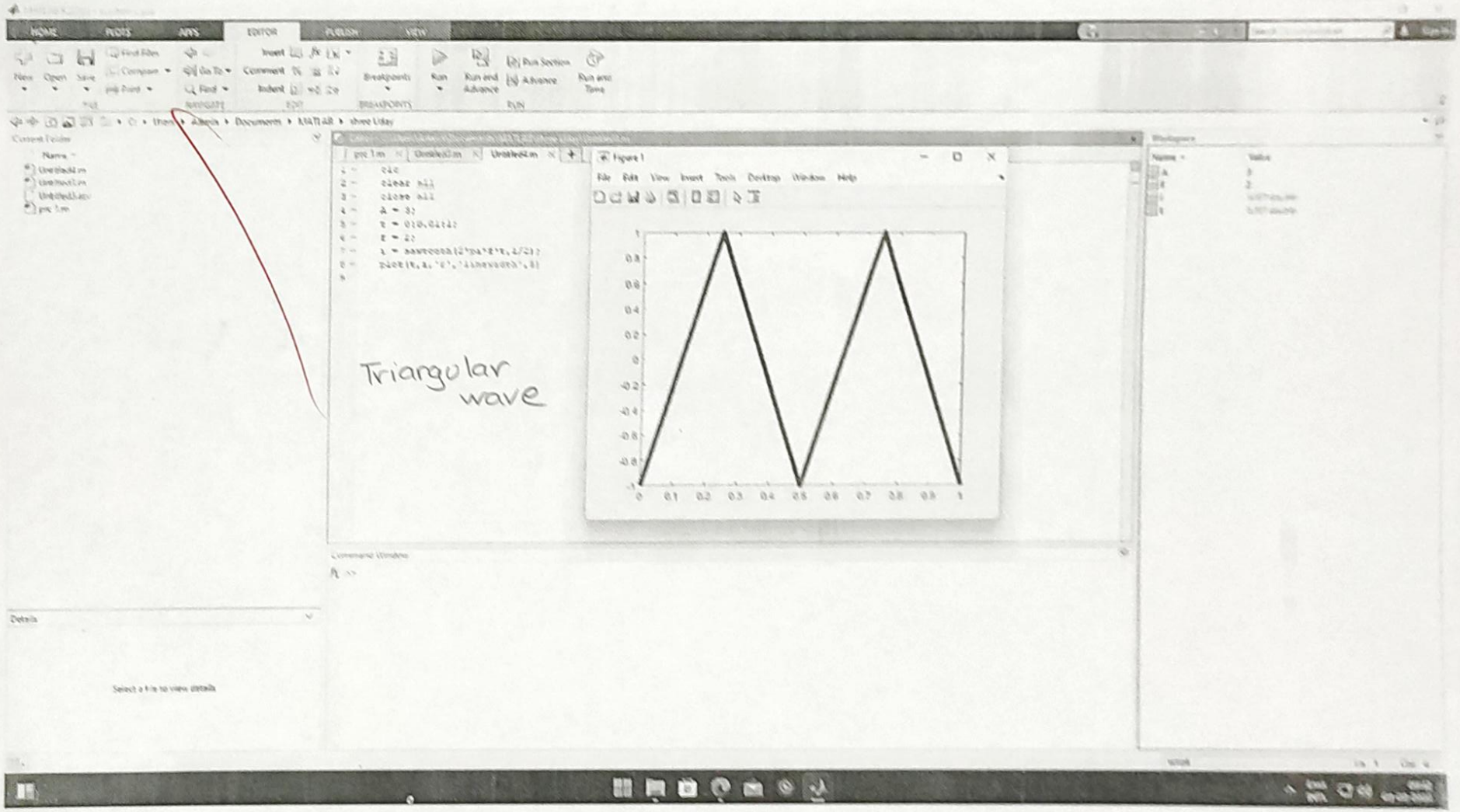

HOME
PLOTS
APPS
EDITOR
PUBLISH
VIEW
New
Open
Save
Find Files
Compare
Print
Go To
Find
Insert
Comment
Indent
Breakpoints
Run
Run and Advance
Run Section
Advance
Run and Time
C: ▸ Users ▸ Admin ▸ Documents ▸ MATLAB ▸ shree Uday
Current Folder
Name
Untitled3.m
Untitled3.asv
prc1.m
Editor - C:\Users\Admin\Documents\MATLAB\shree Uday\Untitled3.m
prc1.m
Untitled3.m
1 - clc
2 - clear all
3 - close all
4 - A = 3;
5 - t = 0:0.01:1;
6 - f = 2;
7 - i = A*sin(2*pi*f*t)
8 - plot(t,i,'r','linewidth',5)
9
sine wave
Figure 1
File Edit View Insert Tools Desktop Window Help
3
2
1
0
-1
-2
-3
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1
Workspace
Name
Value
A 3
f 2
Command Window
Columns 66 through 78
2.8532 2.7145 2.5330 2.3115 2.0536 1.7634 1.4453 1.1044 0.7461 0.3760 0.0000 -0.3760 -0.7461
Columns 79 through 91
-1.1044 -1.4453 -1.7634 -2.0536 -2.3115 -2.5330 -2.7145 -2.8532 -2.9449 -2.9941 -2.9941 -2.9449 -2.8532
Columns 92 through 101
-2.7145 -2.5330 -2.3115 -2.0536 -1.7634 -1.4453 -1.1044 -0.7461 -0.3760 -0.0000
Details
Select a file to view details
script

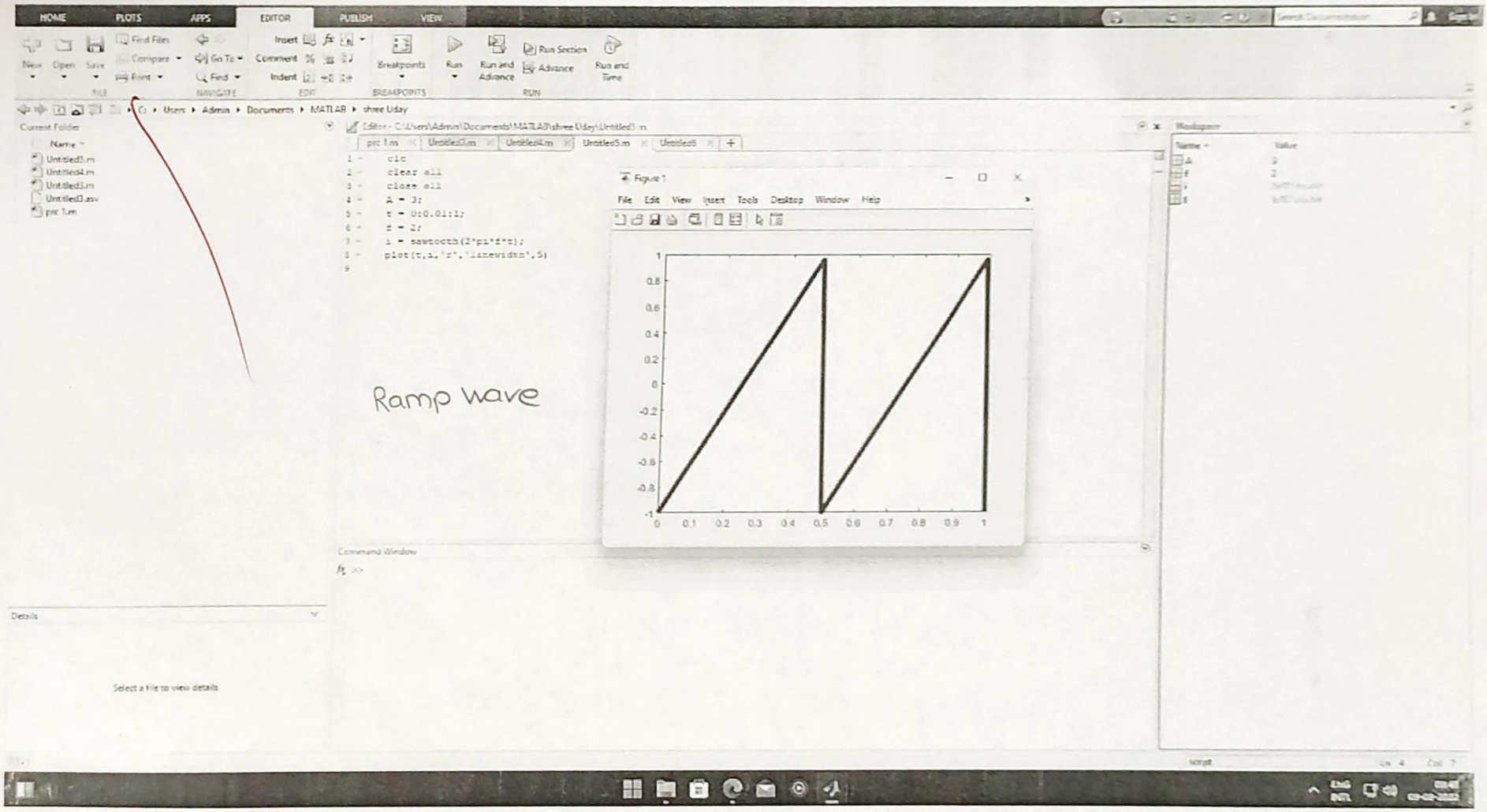
```
clc
clear all
close all
A = 3;
t = 0:0.01:1;
f = 2;
i = A*sign (sin(2*pi*f*t))
plot(t,i,'r','linewidth',5)
```

square wave




```
Columns 45 through 66

    -3    -3    -3    -3    -3    -3    -3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3

Columns 67 through 88

     3     3     3     3     3     3     3     3     3     3    -3    -3    -3    -3    -3    -3    -3    -3    -3    -3    -3    -3

Columns 89 through 101

    -3    -3    -3    -3    -3    -3    -3    -3    -3    -3    -3    -3    -3
```


Triangular wave


HOME
PLOTS
APPS
EDITOR
PUBLISH
VIEW
C: ▸ Users ▸ Admin ▸ Documents ▸ MATLAB ▸ shree Uday
Current Folder
Untitled5.m
Untitled4.m
Untitled3.m
Untitled0.asv
prc 1.m
1 - clc
2 - clear all
3 - close all
4 - A = 3;
5 - t = 0:0.01:1;
6 - f = 2;
7 - y = sawtooth(2*pi*f*t);
8 - plot(t,y,'r','linewidth',5)
Figure 1
File Edit View Insert Tools Desktop Window Help
Ramp wave
Command Window
Details
Select a file to view details

* Post Lab Questions

Q 1) Define Signal

→ A signal is an electric current or electromagnetic field used to convey data from one place to another.

Q 2) Define continous and discrete signal.

→ • Continous - If the amplitude of the signal is defined at every instant of time then it is called continous time signal

• Discrete - If the amplitude of the signal is defined at only at some instants of time then it is called discrete time signal. If the signal.

Q 3) Differentiate between sawtooth and triangular signal.

→ The difference between the triangular wave and sawtooth waveform is that the rise time of triangular wave is always equal to its fall of time while in saw tooth generator, rise time may be much higher than its fall of time, vice versa

Sundaram
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