

sec__1__G2 Documentation

Code:

```
% sec_1_G2 code
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% This is a plot for graph G2 for assignment for section 1
% Refearring to code explanation section for line by line explanation and more inforamtion
time = (-4:1/1000:4); %represents the time period
s_t= 5/2*(sawtooth(pi*time,0)+1); % generate the saw wave with [peroid = 4] rais it up by 1
s =1+square(0.5*pi*time); % generate square wave and raise it up by one
wave2 = s_t .* s;
plot(time,wave2,'LineWidth',2);
grid on
```

Code Explanation:

line 1: `time = (-4:1/1000:4);:`

initiate the time period for our plot

line 2:`s_t= 5/2*(sawtooth(pi*time,0)+1); :`

- generate the sawtooth (see the next bullet point) wave with $5/2$ as a magnitude ,why $5/2$? i will separate this part into two parts the first one (the half part) we raised the plot up by adding 1 which means that our plot will be a double of the original magnitude the second one (the five part) as a result to line 3 (see line 3 explanation below) our wave will be double in magnitude then we didn't use 10 because the result will be 20
- the sawtooth function will have a period of 4 due to this definition:

source : Matlab official documentation, link: <https://www.mathworks.com/help/signal/ref/sawtooth>

sawtooth(t) generates a sawtooth wave with period 2 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 2 and to increase linearly with time with a slope of $1/$ at all other times.

line 3:`s =1+square(0.5*pi*time);:`

- generate square (see the next bullet point) wave raised up by one (amplitude = 2) hence the 5 in line two

- the squarewave function will have a period of 4 due to this definition:

source: Matlab official documentation, link: <https://www.mathworks.com/help/signal/ref/square.html>

square(t) generates a square wave with period 2 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.

line 4: `wave2 = s_t .* s;;`

multiplies the `s_t` (sawtooth) and `s` (square) waves resulting the required function

line 5 and 6: `plot(time,wave2,'LineWidth',2);grid on;;`

plot the `wave2` at the vertical axis and `time` as a horizontal axis with line width of 2 to increase visibility and enable the grid to increase readability

Output plot:

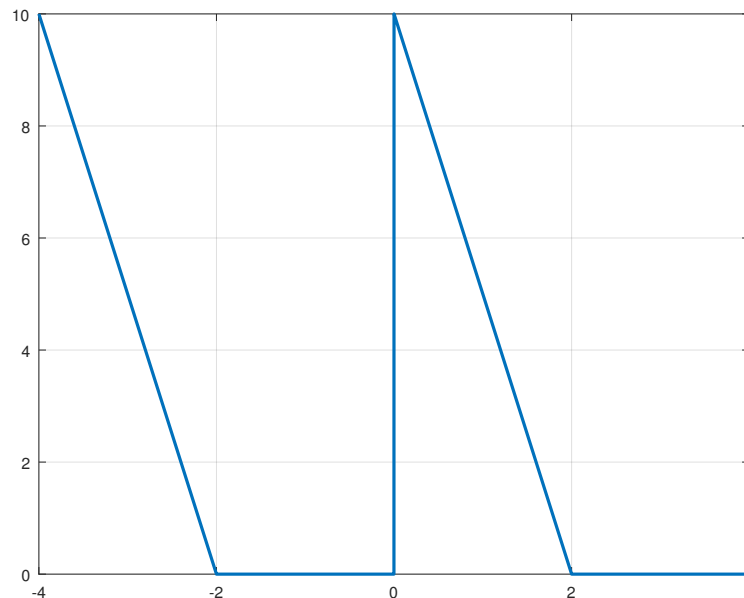


Figure 1: G2_result

sec__1__G3 documentation

plot task description

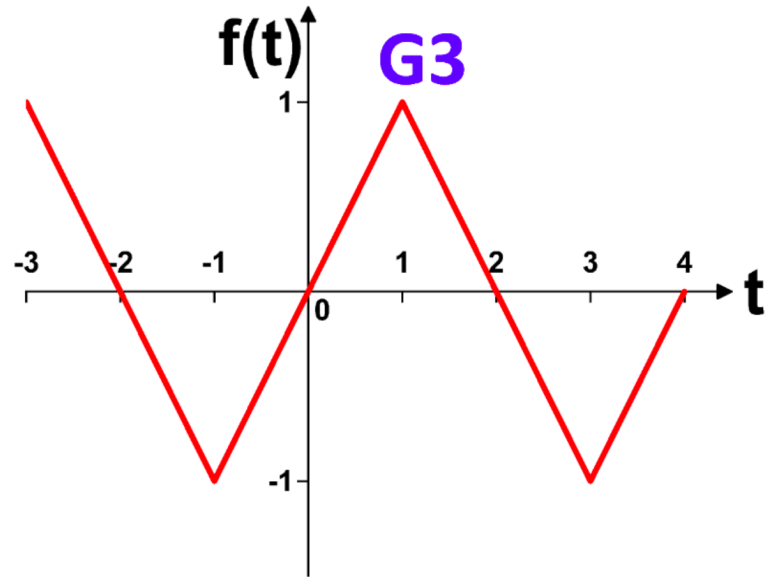


Figure 2: G3

- function type \rightarrow triangle wave
- period $\rightarrow 4$ s
- frequency $\rightarrow .25$ hz
- phase shift $\rightarrow 1$ second
- # of periods $\rightarrow 1.75$

plot boundry :

- 'x-axis' $\Rightarrow -3 : 4$
- 'y-axis' $\Rightarrow -1 : 1$

implemetaion on matlab

description

- define drawn function parameters:
 - freq
 - # of periods
 - phaseshift
 - sample_rate

```
sample_rate = 1000;  
freq = 1/4;  
periods = 1.75/freq;  
phase_shift=1
```

- generate array for x-axis for values from -3 to 4

```
t = -3: 1/sample_rate: -3+(periods-1/sample_rate);
```

- use sawtooth function with parms

```
t => 2*pi*freq*(t+phase_shift)  
xmax => .5
```

full code

```
sample_rate = 1000;  
freq = 1/4;  
periods = 1.75/freq;  
phase_shift=1;  
  
t = -3: 1/sample_rate: -3+(periods-1/sample_rate);  
y = sawtooth((2*pi*freq*(t+phase_shift)),.5);  
  
plot(t, y)
```

result graph

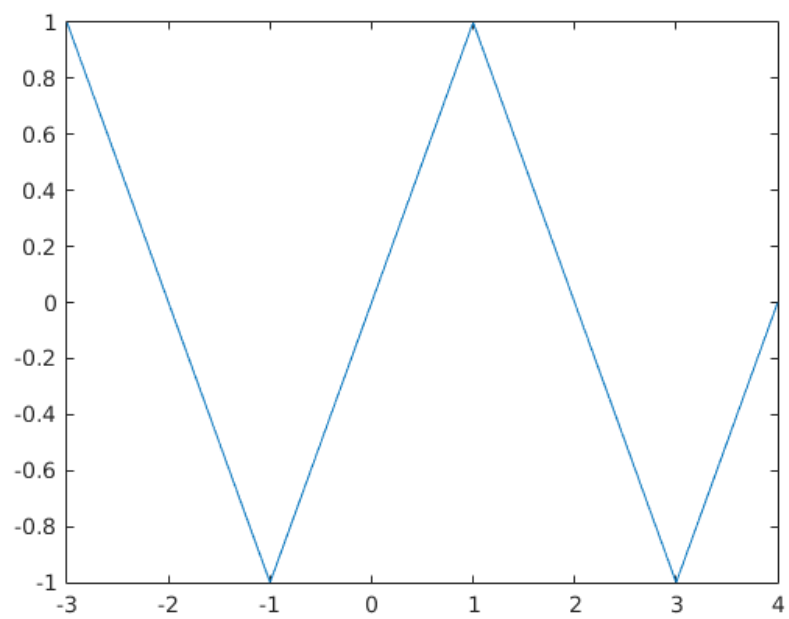


Figure 3: G3_result