# 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
% Refearing to code explanation section for line by line explaination 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.ht

  `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;`:

multiples 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:

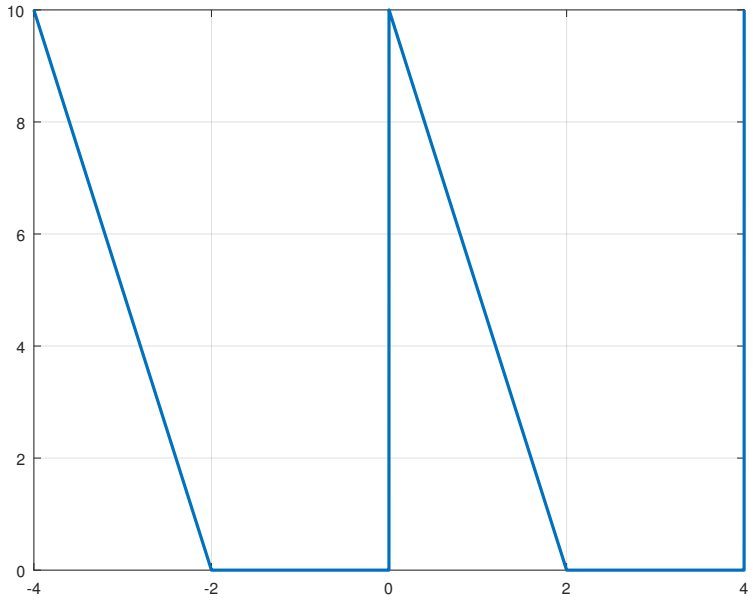


Figure 1: G2_result

# sec_1_G3 documentation

## plot task description

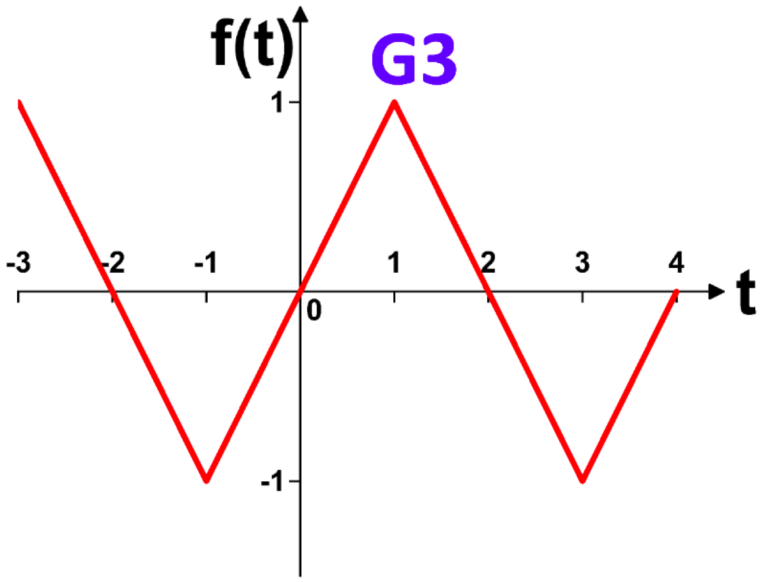


Figure 2: G3

- function type → triangle wave
- period → 4 s
- frequancy→ .25 hz
- phase shift → 1 second

- # of periods→ 1.75

plot boundry :

- 'x-axis' => -3 : 4
- 'y-axis' => 1 : 1

## implemetaion on matlab

### desciption

- define drawed 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**

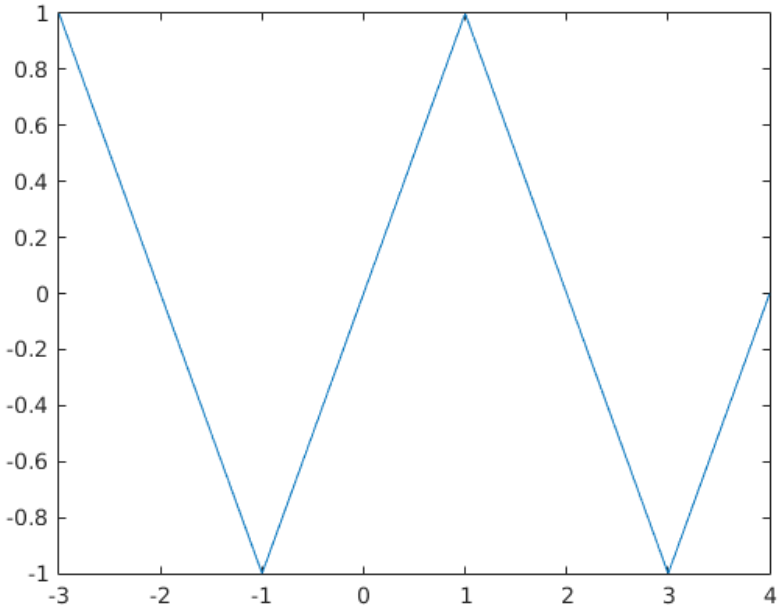


Figure 3: G3_result