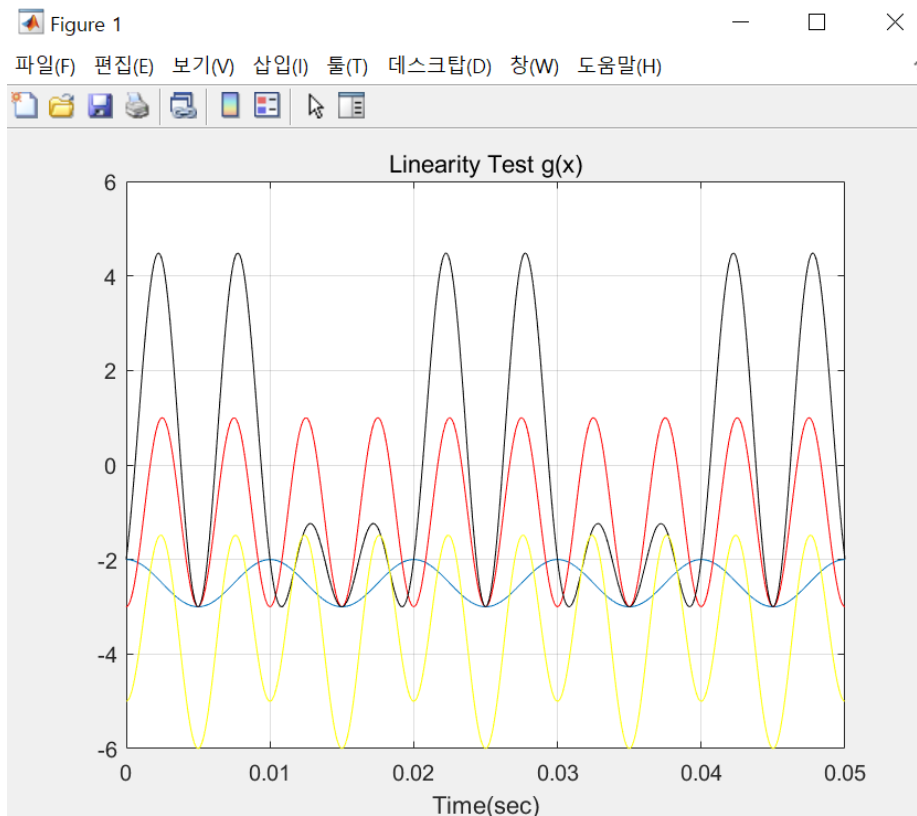


Assignment #5 (Linearity Test)

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1. $g(x)$ function Test



$g(x_1)$ – blue color

$g(x_2)$ – red color

$g(x_1+x_2)$ – black color

$g(x_1) + g(x_2)$ – yellow color

=> Linearity를 만족한다면 검정색의 그래프와 노랑색의 그래프가 동일해야 하는데, 다르므로, **Linearity를 만족하지 않는 함수이다.**

Code

```
>>%20153865 김민석

>> f = 50;

>> t = linspace(0,0.05,501);

>> x1 = cos(2*pi*f*t);

>> x2 = 2*sin(4*pi*f*t);


>> g_x1 = x1.^2 - 3;

>> g_x2 = x2.^2 - 3;

>> g_x1x2 = (x1+x2).^2 - 3;

>> g_sum = g_x1 + g_x2;


>> plot(t, g_x1); hold on

>> plot(t, g_x2, 'r');

>> plot(t, g_x1x2, 'k');

>> plot(t, g_sum, 'y');

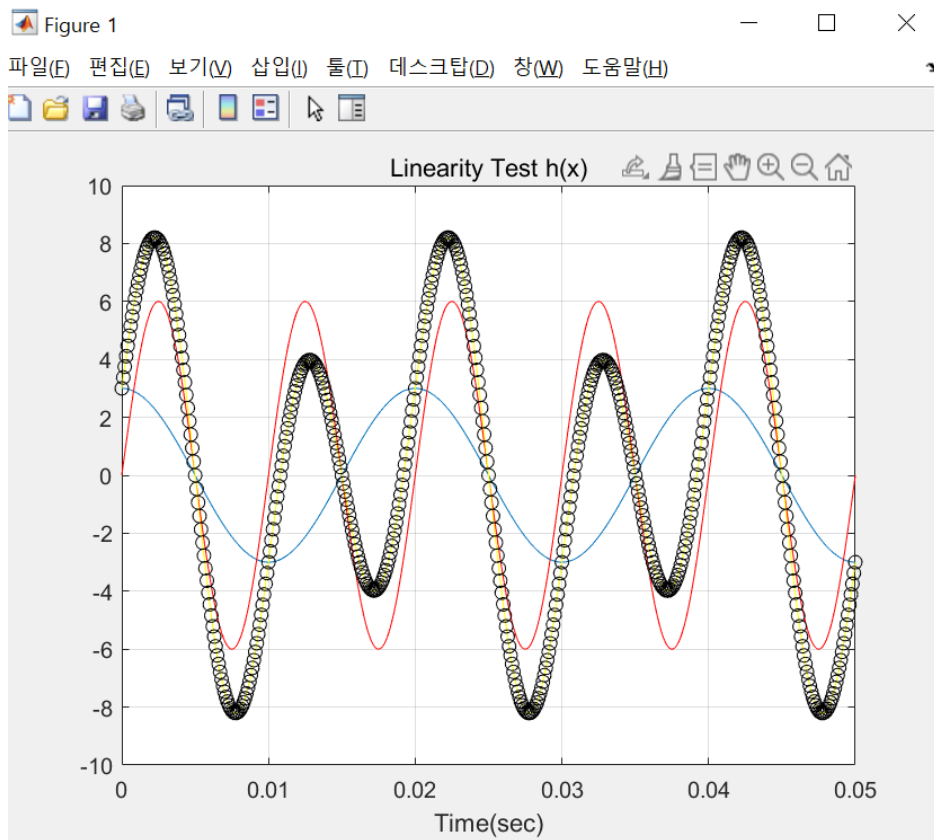
>> grid on;

>> title('Linearity Test g(x)');

>> xlabel('Time(sec)');

>> hold off;
```

2. $h(x)$ function Test



$h(x_1)$ – blue color

$h(x_2)$ – red color

$h(x_1+x_2)$ – black color + circle marker

$h(x_1) + h(x_2)$ – yellow color

=> Linearity를 만족한다면 검정색의 그래프와 노랑색의 그래프가 동일해야 하는데, 같으므로, **Linearity를 만족하는 함수이다.**

#Code

```
>> 20153865 김민석

>> f = 50;

>> t = linspace(0,0.05,501);

>> x1 = cos(2*pi*f*t);

>> x2 = 2*sin(4*pi*f*t);

>>

>> h_x1 = 3*x1;

>> h_x2 = 3*x2;

>> h_x1x2 = 3*(x1+x2);

>> h_sum = h_x1 + h_x2;

>>

>> plot(t, h_x1); hold on

>> plot(t, h_x2, 'r');

>> plot(t, h_x1x2, 'k');

>> plot(t, h_sum, 'y');

>> plot(t, h_x1x2, 'ko');

>> grid on

>> title('Linearity Test h(x)');

>> xlabel('Time(sec)');

>> hold off
```