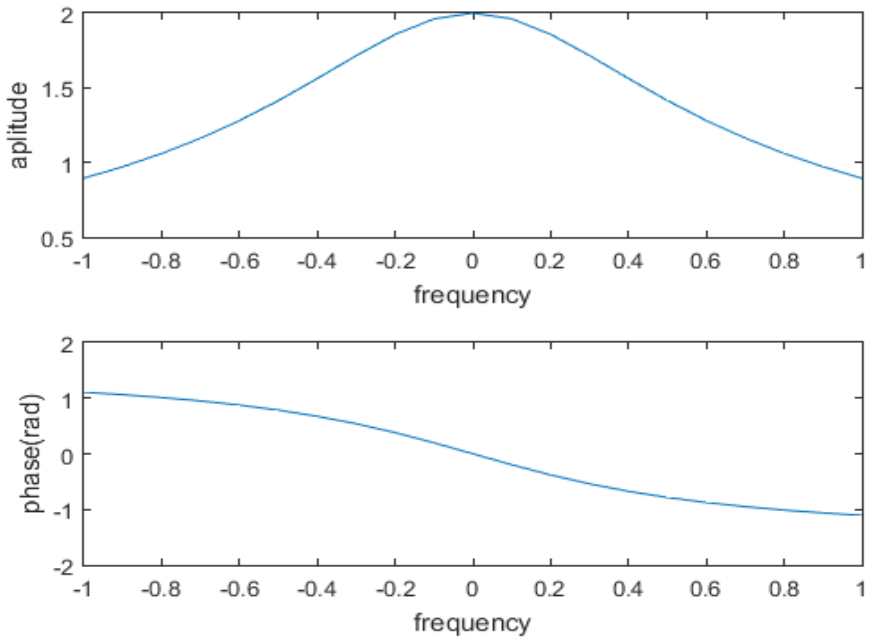
Problem: Fourier Transformation Signal Representation.

Source code:

```
Clc;
clear all;
close all;

syms  t w
a = .5;
f = exp(-a*t) * heaviside(t);
an = fourier(f,w);
ww = -2*a: .1 :2*a;

subplot(2,1,1);
a = subs(an,w,ww);
subplot(2,1,1);
plot(ww, abs(a));
xlabel('frequency');  ylabel('aplitude');

subplot(2,1,2);
plot(ww,angle(a));
```

```
xlabel('frequency');  ylabel('phase(rad)');
```

Output:



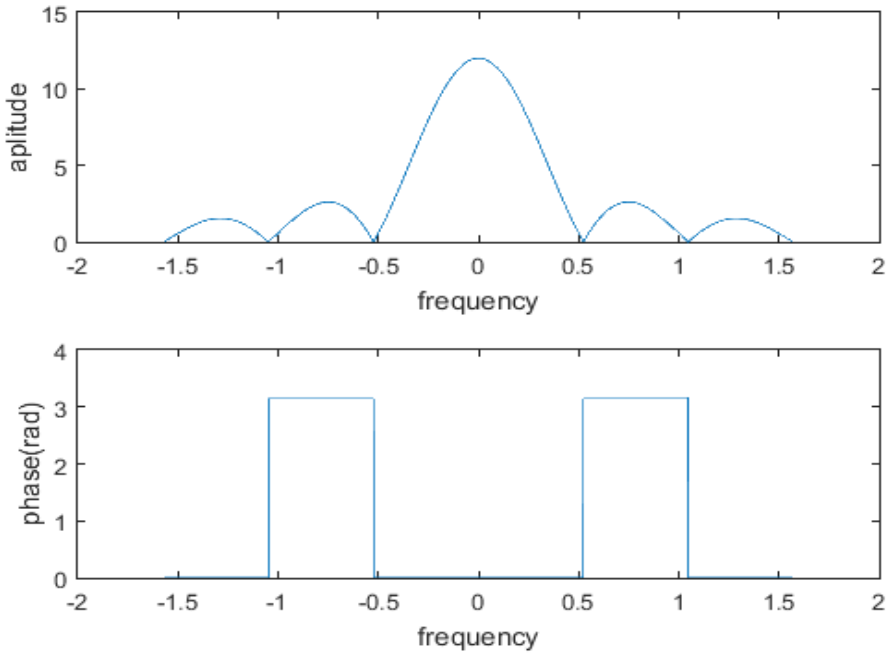
Problem: Rectangular Pulse Representation.

Source code:

```
clc;
close all;
clear all;
```

```
syms t  %considering t and k as symbolic parameter
syms  t w

f = heaviside(t+6) - heaviside(t-6);
%f = exp(-a*t) * heaviside(t);
To = 6;
an = fourier(f,w);
ww = -3*pi/To: .001 :3*pi/To;

subplot(2,1,1);
a = subs(an,w,ww);

subplot(2,1,1);
plot(ww, abs(a));

xlabel('frequency'); ylabel('aplitude');

subplot(2,1,2);
plot(ww,angle(a));

xlabel('frequency'); ylabel('phase(rad)');
```

Output:



Problem: Linearity Property Representation.

Source code:

```
clc;
clear all;
close all;

syms t w
a1 = 3;
```

```
a2 = 2;
x1 = exp(-3*t);
x2 = exp(-t);
ww = -2: 0.1 :2;
z = (a1*x1 + a2*x2);
x = fourier(a1*x1, w) + fourier(a2*x2, w);
y = fourier(z, w);

x1 = subs(x,w,ww);
y1 = subs(y,w,ww);
%plot(ww,abs(x1), ww, abs(y1));

disp(x)
disp(y)
```

Output:

- *2*fourier(exp(-t), t, w) + 3*fourier(exp(-3*t), t, w)*

- *2*fourier(exp(-t), t, w) + 3*fourier(exp(-3*t), t, w)*