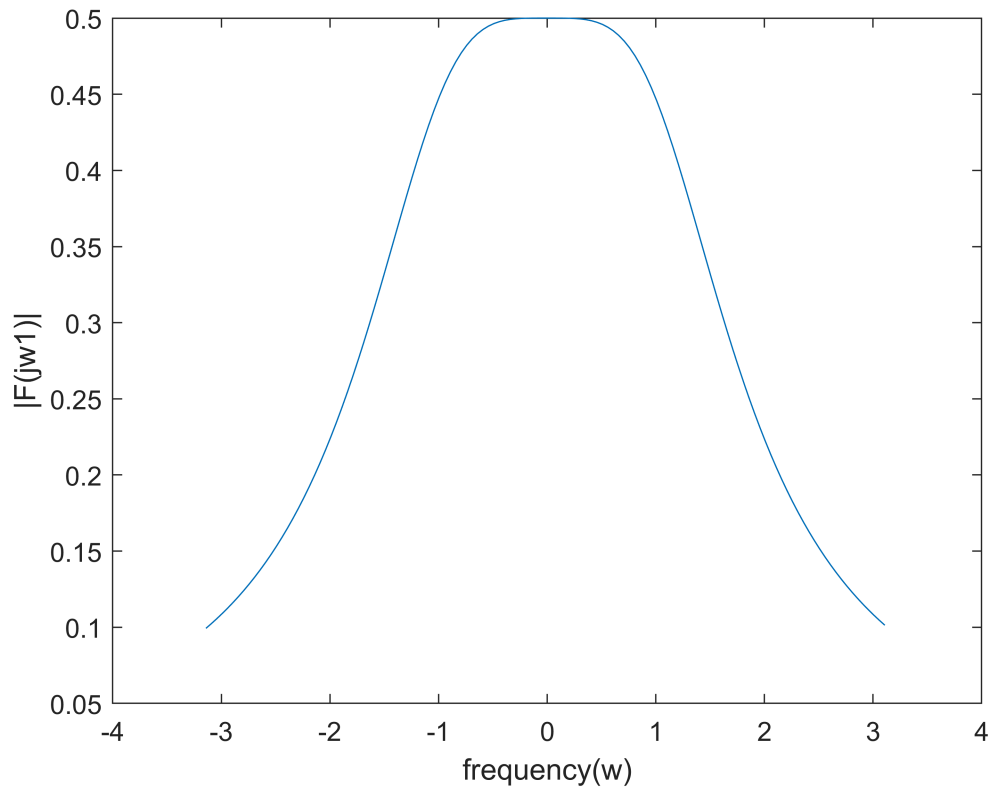


SIMULATIONS FOR THE ASSIGNMENT-6 QUESTION-2

Consider the signal $x(t) = \exp(-t)\sin(t)$

```
w = -pi:0.05:pi;  
Fjw1 = 1./(1+((1+(i*w)).^2));  
figure;  
plot(w,abs(Fjw1))  
xlabel('frequency(w)')  
ylabel('|F(jw1)|')
```

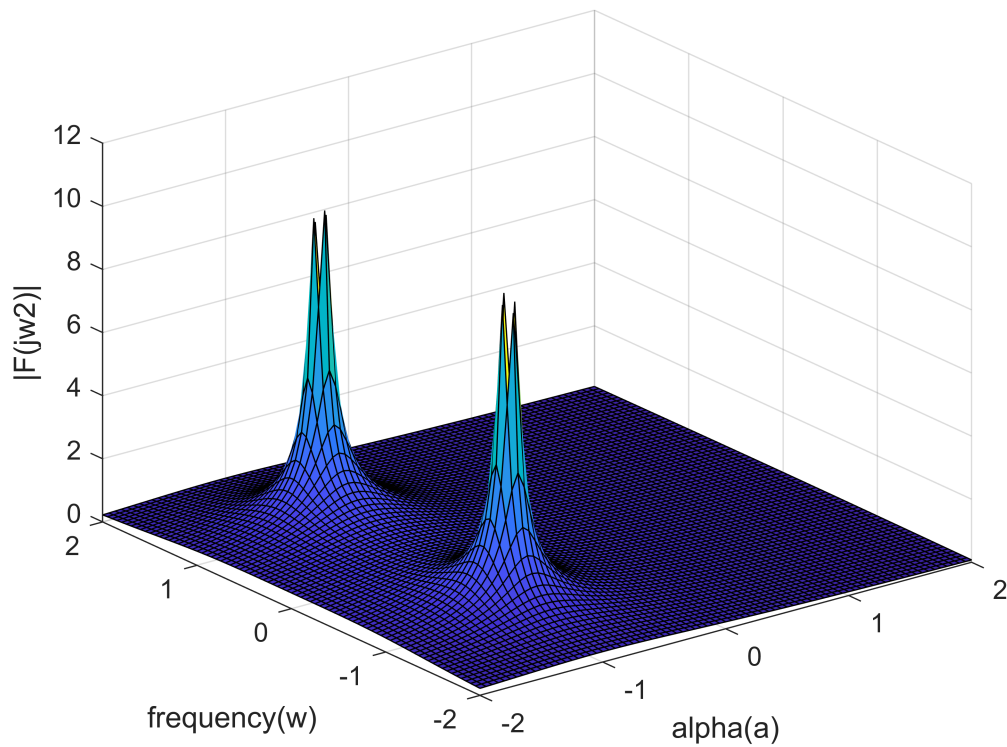


Plotting the magnitude of the fourier transform

Now for the same time domain signal using laplace transform

Sweeping alpha and omega and plotting the magnitude of laplace transform

```
alpha = -2:0.05:2;  
omega = -2:0.05:2;  
[xa,xw] = meshgrid(alpha,omega);  
Fjw2 = 1./(1+((1+ xa + (i*xw)).^2));  
figure;  
surf(xa,xw,abs(Fjw2));  
xlabel('alpha(a)')  
ylabel('frequency(w)')  
zlabel('|F(jw2)|')
```

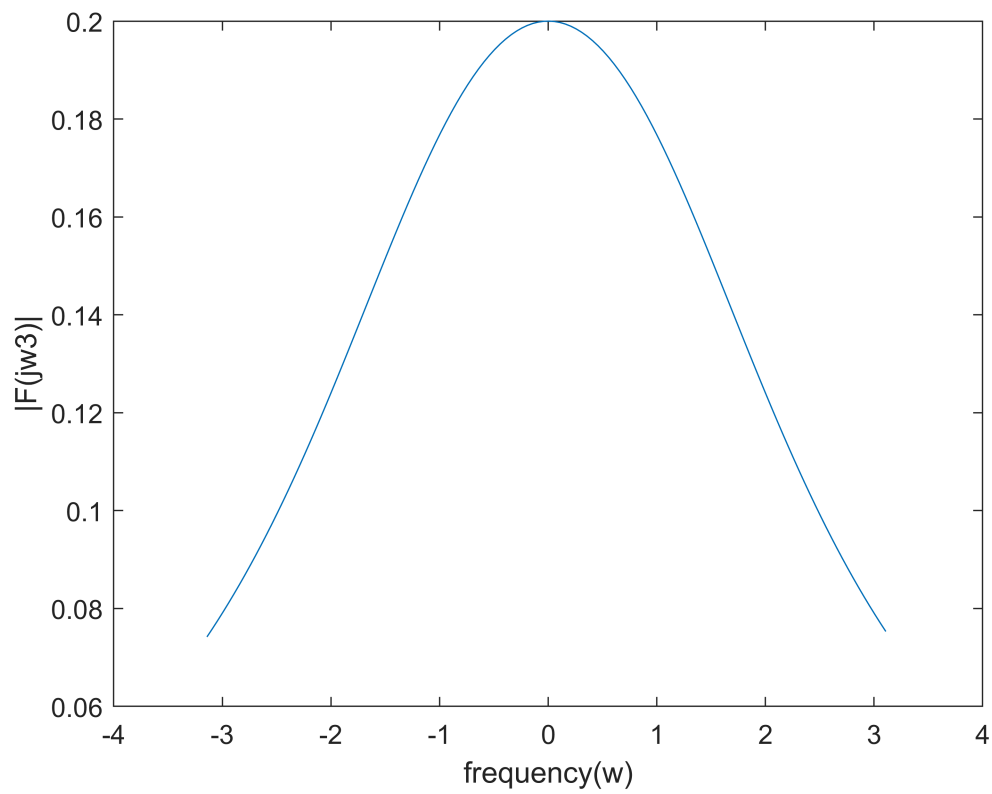


We observe from surface plot at $\alpha = 0$ we observe the shape of curve is same as previous plot

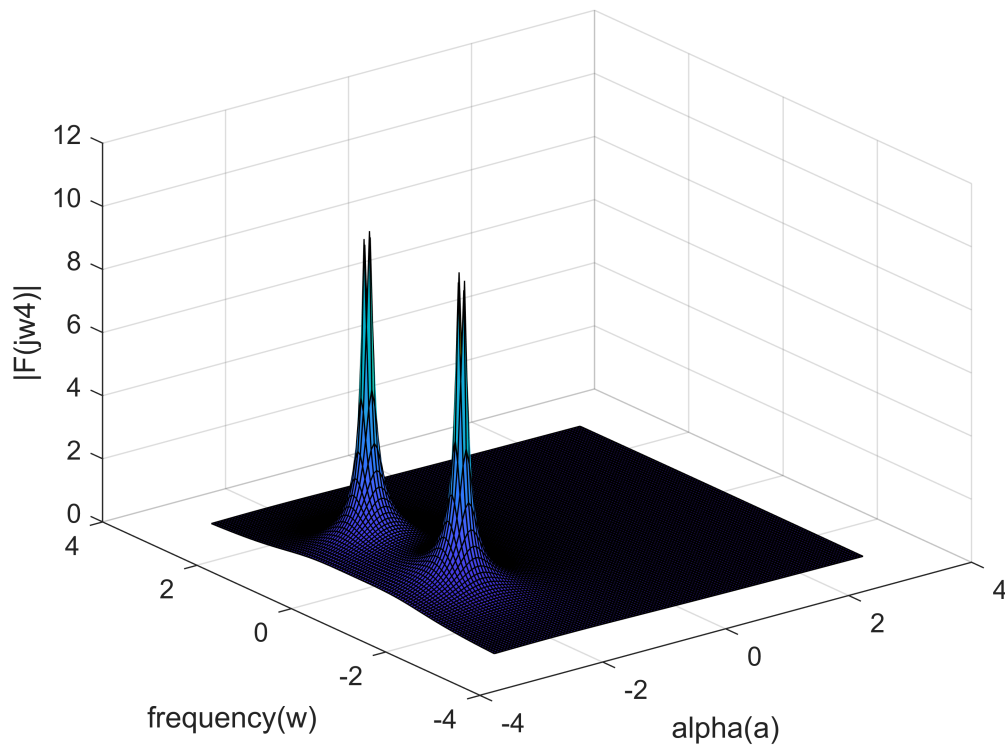
At $\alpha = -1$ and $\omega = -1$ and $+1$ we observe the delta functions goes to infinity

Consider the signal $x(t) = \exp(-2*t)\sin(t)$

```
Fjw3 = 1./((1+((2+(i*w)).^2)));
figure;
plot(w,abs(Fjw3))
xlabel('frequency(w)')
ylabel('|F(jw3)|')
```



```
alpha1 = -3:0.05:3;
omega1 = -3:0.05:3;
[xa1,xw1] = meshgrid(alpha1,omega1);
Fjw4 = 1./(1+((2+ xa1 + (i*xw1)).^2));
figure;
surf(xa1,xw1,abs(Fjw4));
xlabel('alpha(a)')
ylabel('frequency(w)')
zlabel('|F(jw4)|')
```



As from this at $\alpha = -2$ and $\omega = -1$ and $+1$ we observe delta functions goes to infinity

From this the axis α corresponds to exponential decay and axis ω corresponds to sinusoidal functions

Laplace transform of given time domain signal

Using symbolic function and substituting $s = \alpha + j\omega$

```
syms s t a b
a = laplace(exp(-a*t)*sin(b*t));
disp(a)
```

$$\frac{b}{(a + s)^2 + b^2}$$