

Report 1

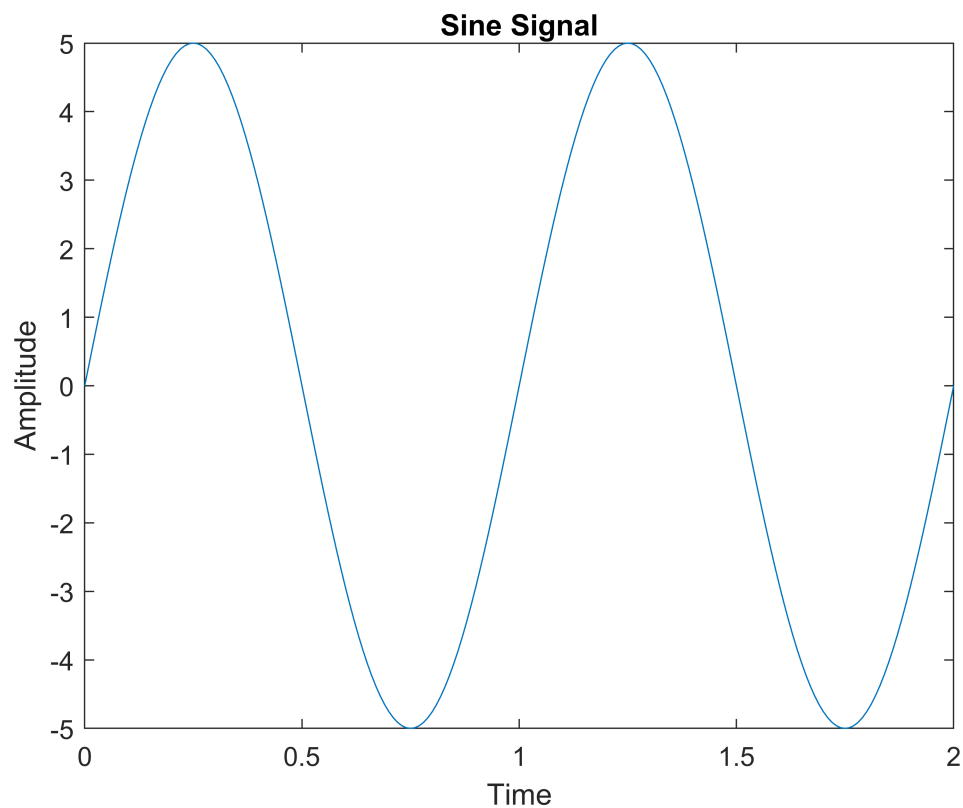
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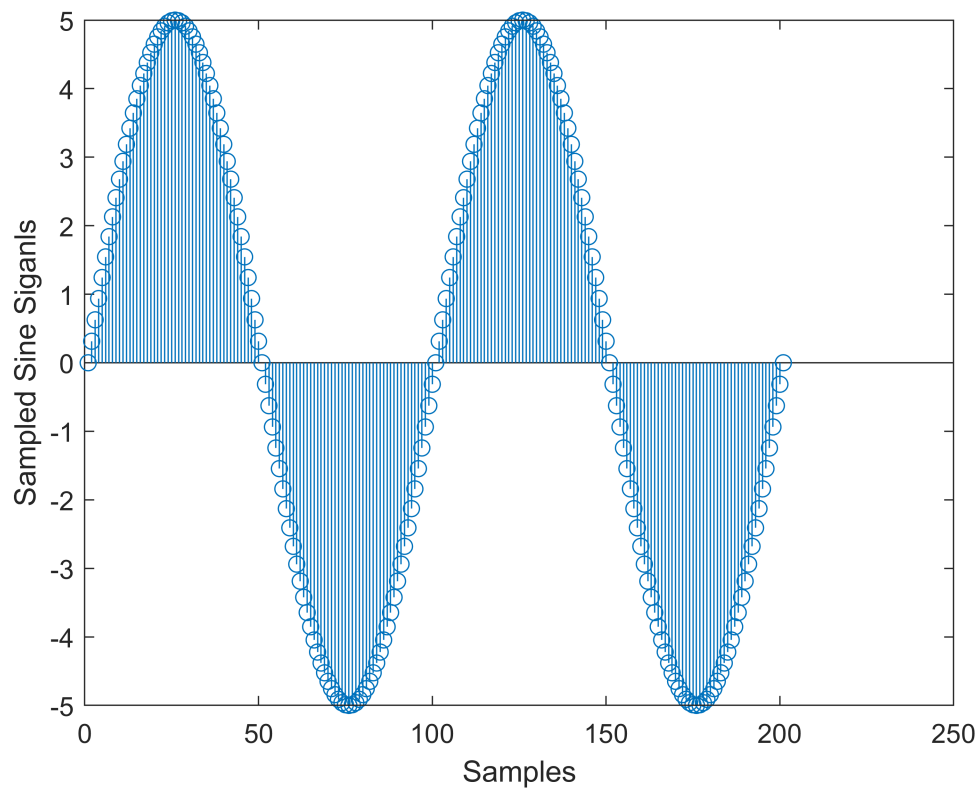
1. Stem and Plot Command:

showing a Sine with plot and stem built-in functions of MatLab.

```
t = 0:0.01:2;  
x = 5*sin(2*pi*(t));  
plot(t,x);  
title("Sine Signal");  
xlabel("Time");  
ylabel("Amplitude");
```



```
stem(x);  
xlabel("Samples");  
ylabel("Sampled Sine Signals");
```



2.Subplot Command:

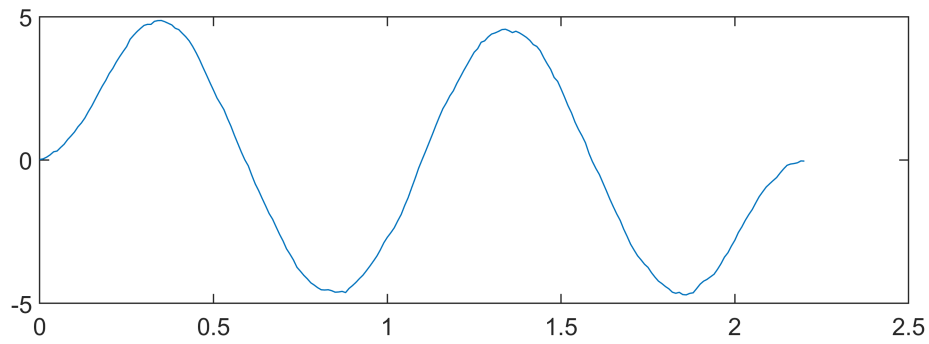
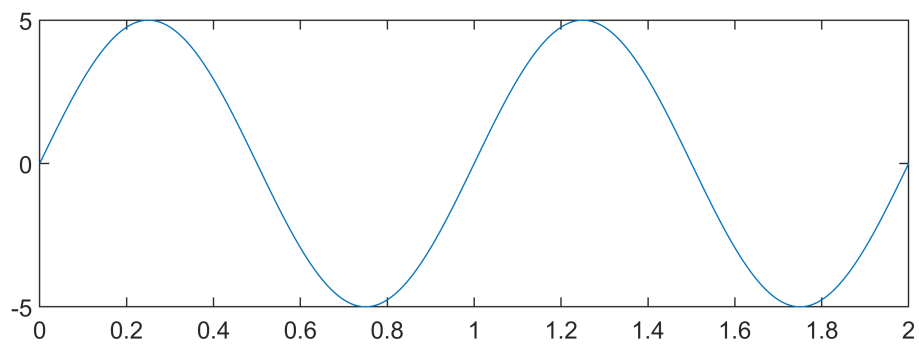
Then we define a random signal (noise) and add it to the sinusoidal signal we defined in the previous section. Then, we display the result using the **subplot** command.

```
noise = 2*rand(1,length(t))-1;
noisysignal=noise + x;
figure;
subplot(2,1,1);
plot(t,x);
subplot(2,1,2);
plot(t,noisysignal);
```

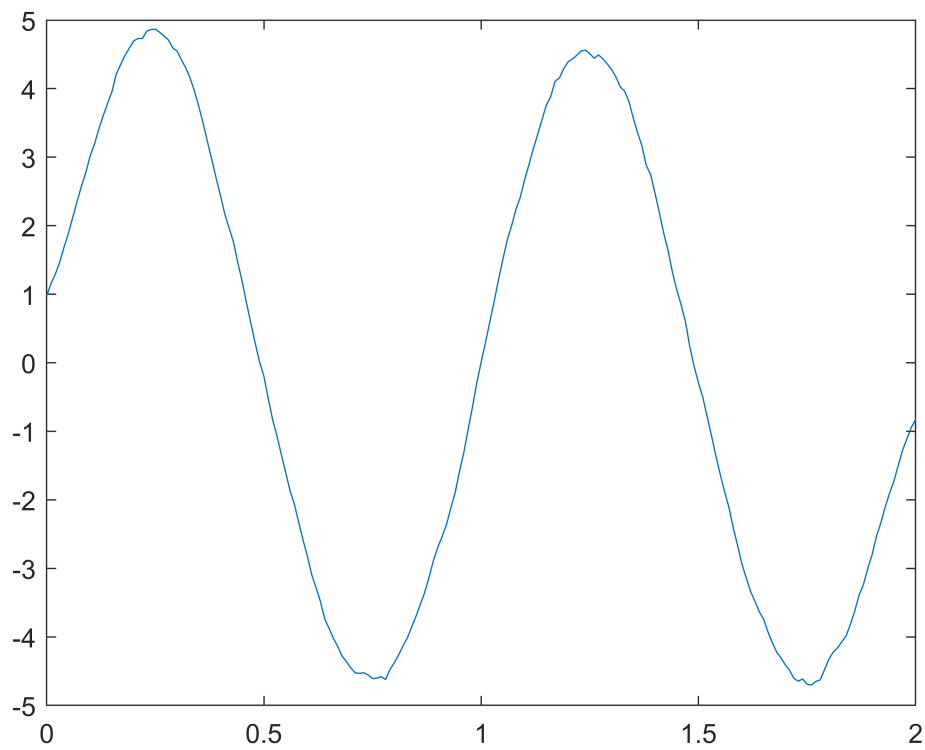
3.Conv Command:

Then, we pass the noisy signal through a moving average filter.

```
movingaverage = ones(1,21)/21;
convolution = conv(noisysignal,movingaverage);
Ts=0.01;
t_conv = linspace(t(1), t(1) + Ts * (length(convolution) - 1), length(convolution));
plot (t_conv,convolution);
```



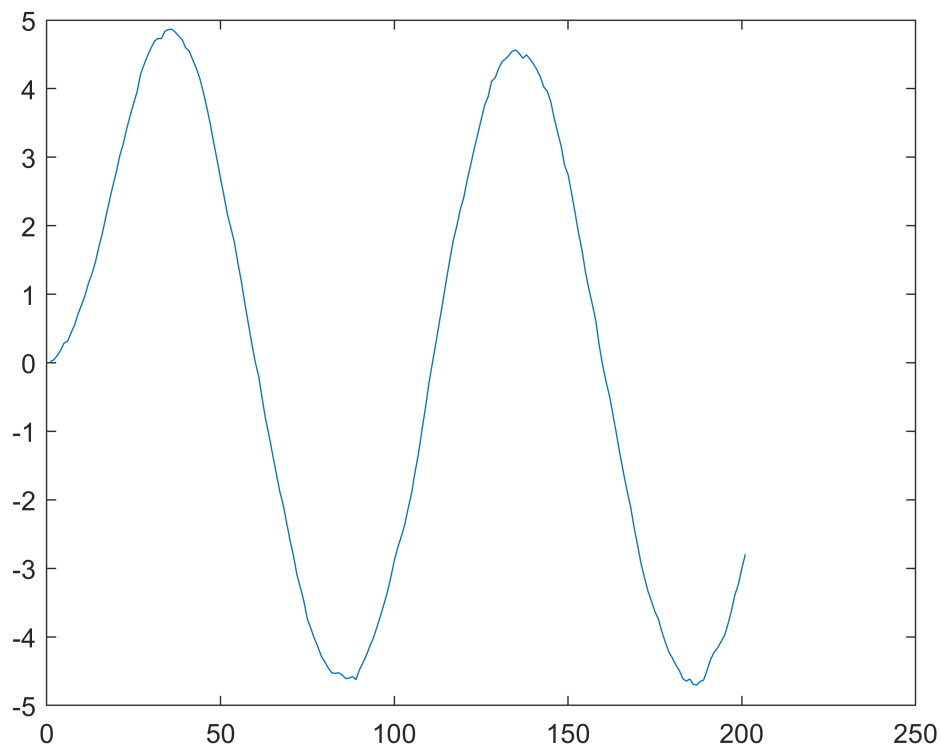
```
convolvedsignal = conv(noisysignal,movingaverage,'same');  
figure;  
plot(t,convolvedsignal);  
hold on;
```



4.Filter Command:

Applying the same approach, but this time using the **filter()** function instead of **conv()**.

```
movingaverage = ones(1,21)/21;  
filteredsignal = filter(movingaverage,1,noisysignal);  
  
figure;  
plot(1:length(filteredsignal),filteredsignal);  
hold on;
```



5. Defining Function:

Then, we create **singen(w, n)** and resample it to observe the given result.

```
f1 = 1000;
f2 = 4000;
f3 = 6000;
Fs = 5000;
t_start = 0;
t_end = 0.004;
dt = 1/(100 * f3);

t_continuous = t_start:dt:t_end;

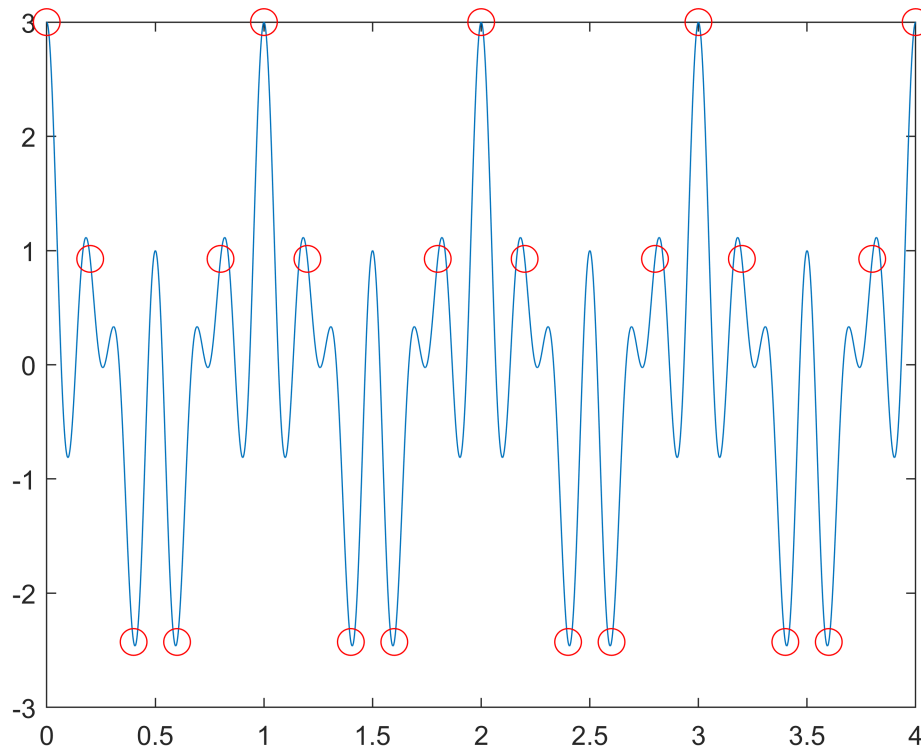
x_continuous = cos(2*pi*f1*t_continuous) + cos(2*pi*f2*t_continuous) + cos(2*pi*f3*t_continuous);

figure;
plot(t_continuous*1000, x_continuous);
hold on;

t_sampled = t_start:1/Fs:t_end;
```

```
x_sampled = cos(2*pi*f1*t_sampled) + cos(2*pi*f2*t_sampled) + cos(2*pi*f3*t_sampled);

plot(t_sampled*1000, x_sampled, 'ro','MarkerSize',10);
```



```
t_reconstructed = t_continuous;
x_reconstructed = sinc_interp(x_sampled, t_sampled, t_reconstructed, Fs);
```

Unrecognized function or variable 'sinc_interp'.

```
plot(t_reconstructed*1000, x_reconstructed, 'g--');
plot(t_reconstructed*1000, x_reconstructed, 'ko');
```

```
grid on;
hold off;
```