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Program Initialization

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

Generation of Sinusoidal Signal

```
% Amplitude
A=5;
%Frequency of signal
fm=70;
% Sampling Frequency
fs=1400;
% Duration of Signal
t=0:1/fs:1;
xn=A*sin(2*pi*fm*t);
```

FFT Computation of Pure Sinusoidal Signal

```
N=700;
% frequency specification
f=(0:1:(floor(N/2)-1)).*fs/N;
%FFT of signal
Xk=fft(xn,N);
Xkssb=Xk(1:N/2);
Xkssb=Xkssb./(N/2);
%Magnitude specification
Xkssbm=abs(Xkssb);
```

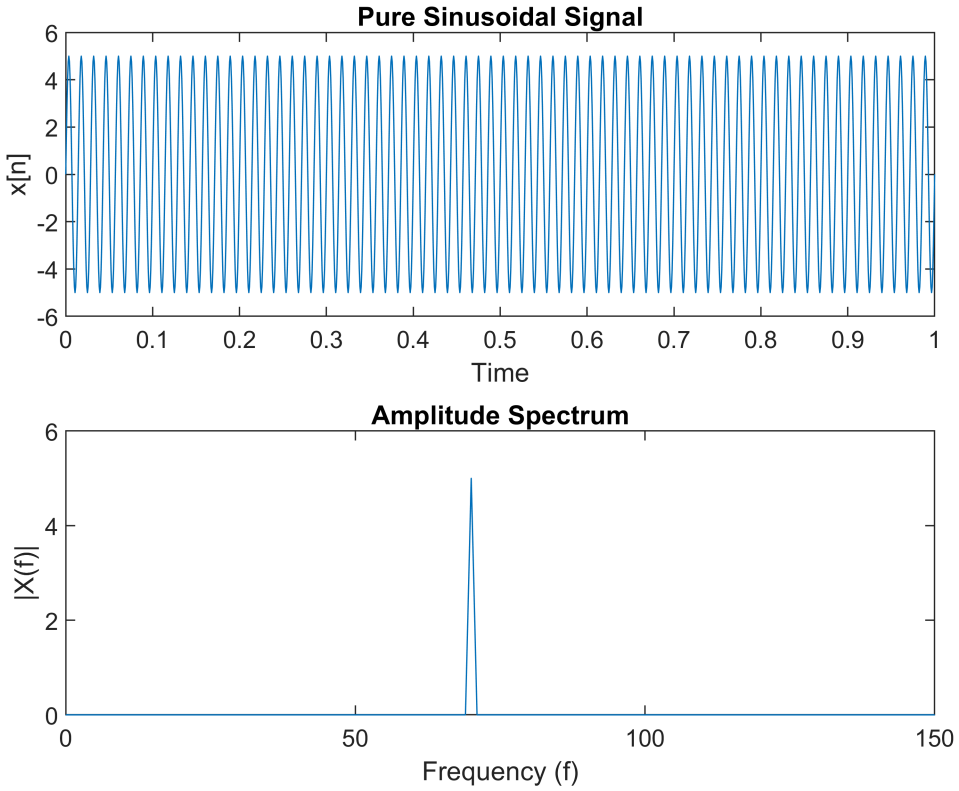
Generation of Plots for Pure Sinusoid

```
figure(1);
title('Signal Visualization in Time and Frequency Domain')

subplot(211);
plot(t,xn);
xlabel('Time');
ylabel('x[n]');
title('Pure Sinusoidal Signal');
axis([0 1 -6 6]);

subplot(212);
plot(f,Xkssbm);
```

```
title('Amplitude Spectrum');
xlabel('Frequency (f)');
ylabel('|X(f)|');
axis([0 150 0 6]);
```



Impinging Noise onto Signal

```
% Generation of Noise
k=1.2;
nsig=k*randn(1,length(xn));
% Impinging noise
xnn=xn+nsig;
```

FFT Computation of Signal with Noise

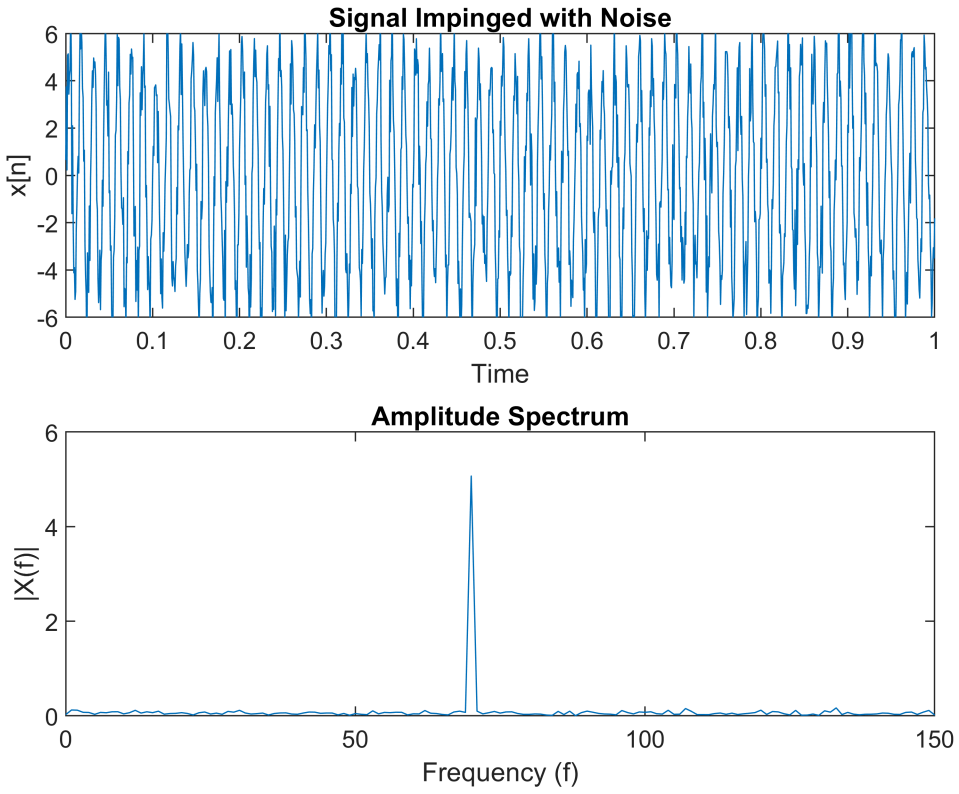
```
%FFT of signal
Xnk=fft(xnn,N);
Xnkssb=Xnk(1:N/2);
Xnkssb=Xnkssb./(N/2);
%Magnitude specification
Xnkssbm=abs(Xnkssb);
```

Generation of plots for Signal with Noise

```
figure(2);
title('Signal with Noise Visualization in Time and Frequency Domain')

subplot(211);
plot(t,xnn);
xlabel('Time');
ylabel('x[n]');
title('Signal Impinged with Noise');
axis([0 1 -6 6]);

subplot(212);
plot(f,Xnkssbm);
title('Amplitude Spectrum');
xlabel('Frequency (f)');
ylabel('|X(f)|');
axis([0 150 0 6]);
```



System Definition

```
M=12;
b=ones(1,M)./M;
```

Generation of Filtered Output

```
yn=filter(b,1,xnn);
```

FFT Computation of Filtered Output

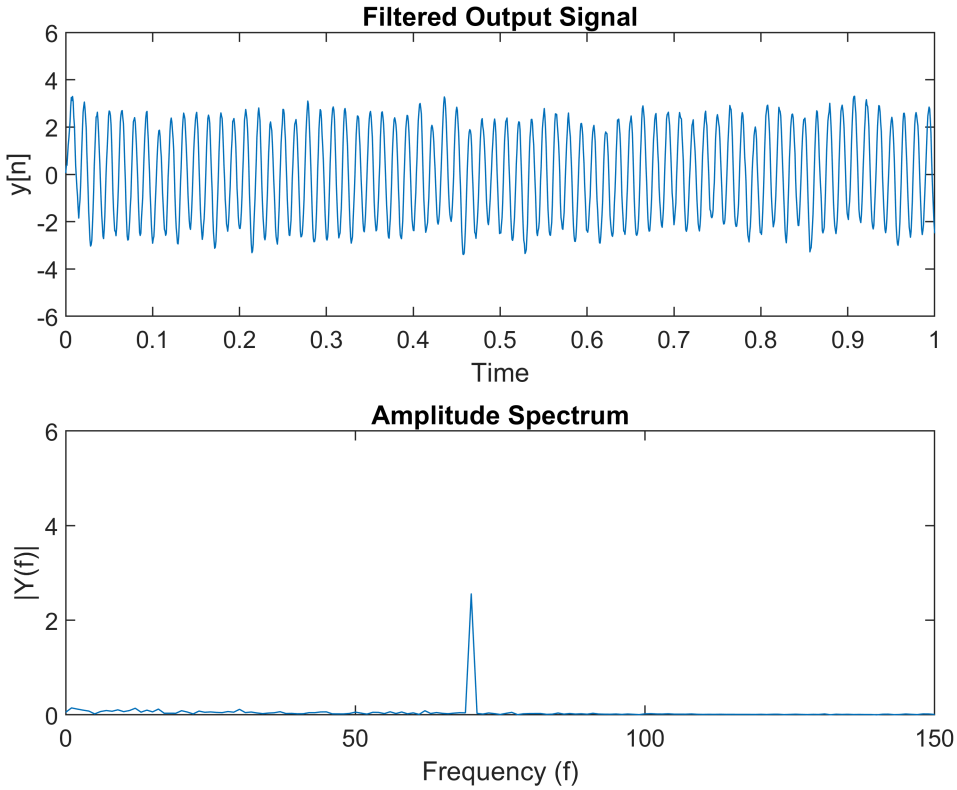
```
%FFT of signal
Yk=fft(yn,N);
Ykssb=Yk(1:N/2);
Ykssb=Ykssb./(N/2);
%Magnitude specification
Ykssbm=abs(Ykssb);
```

Generation of plots for Filtered Output

```
figure(3);
title('Filtered Output Signal Visualization in Time and Frequency Domain')

subplot(211);
plot(t,yn);
xlabel('Time');
ylabel('y[n]');
title('Filtered Output Signal');
axis([0 1 -6 6]);

subplot(212);
plot(f,Ykssbm);
title('Amplitude Spectrum');
xlabel('Frequency (f)');
ylabel('|Y(f)|');
axis([0 150 0 6]);
```


Filtered Output Signal
y[n]
Time
6
4
2
0
-2
-4
-6
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

Amplitude Spectrum
|Y(f)|
Frequency (f)
6
4
2
0
0
50
100
150