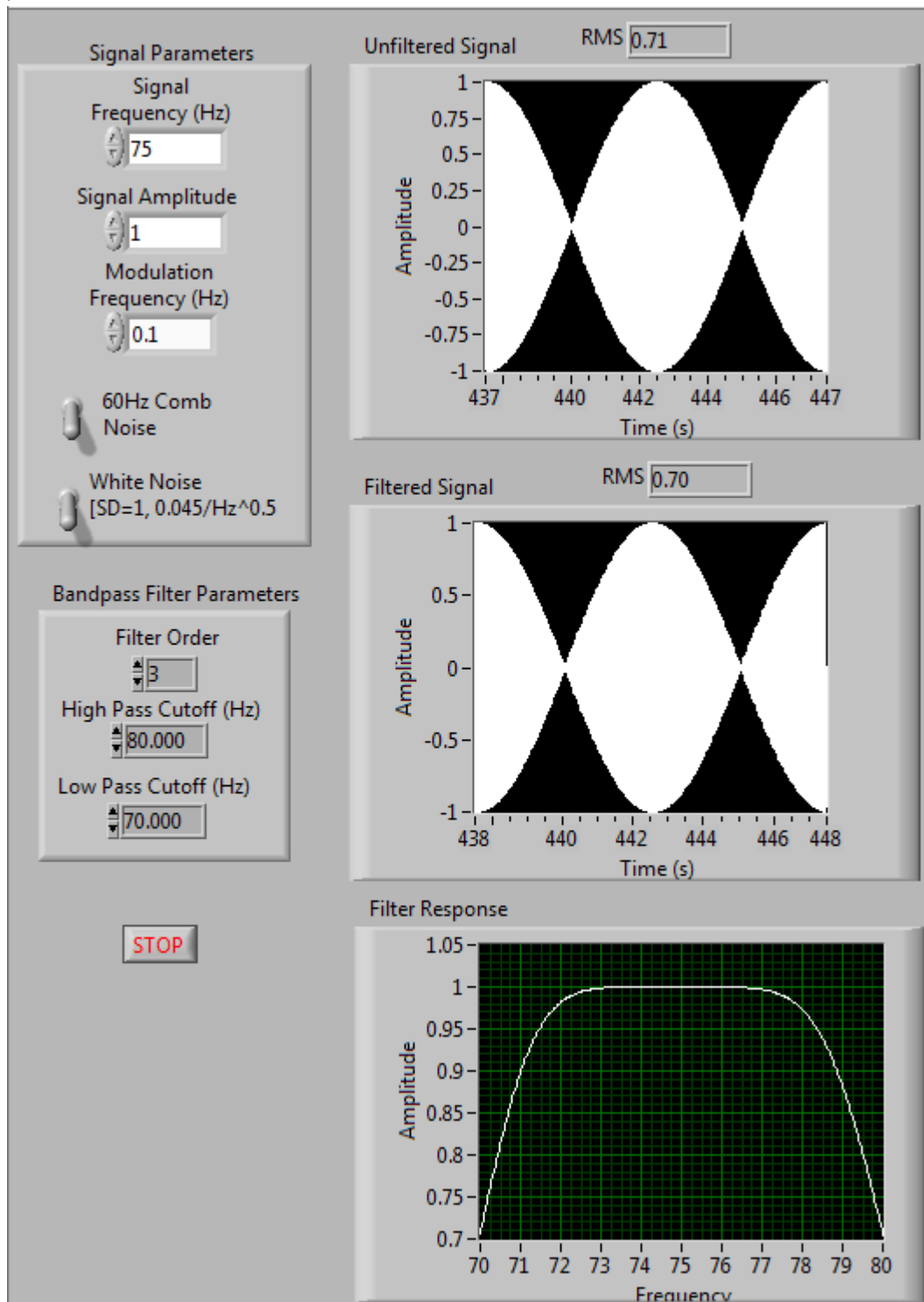


Lab 11

Problem 1:



Signal Parameters

Signal
Frequency (Hz)

75

Signal Amplitude

1

Modulation
Frequency (Hz)

0.1

60Hz Comb
Noise

White Noise
[SD=1, 0.045/Hz^{0.5}]

Bandpass Filter Parameters

Filter Order

3

High Pass Cutoff (Hz)

75.150

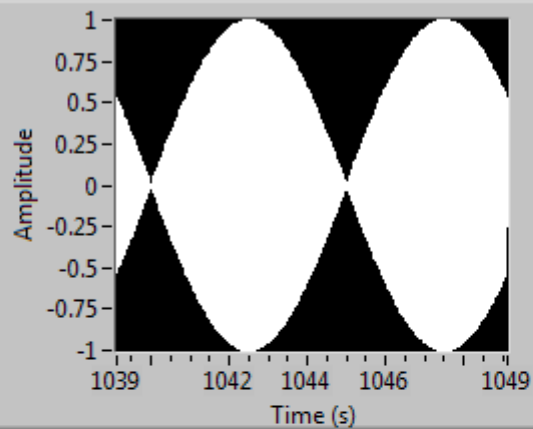
Low Pass Cutoff (Hz)

74.850

STOP

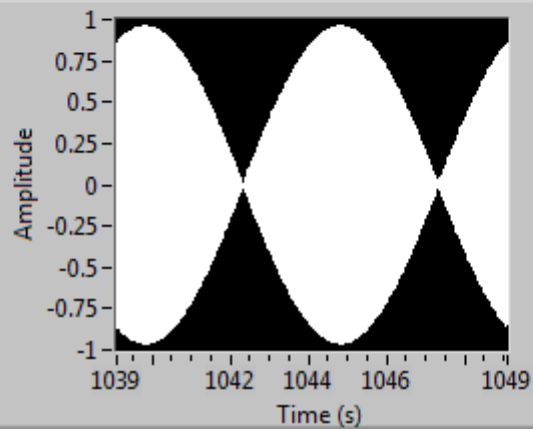
Unfiltered Signal

RMS 0.40

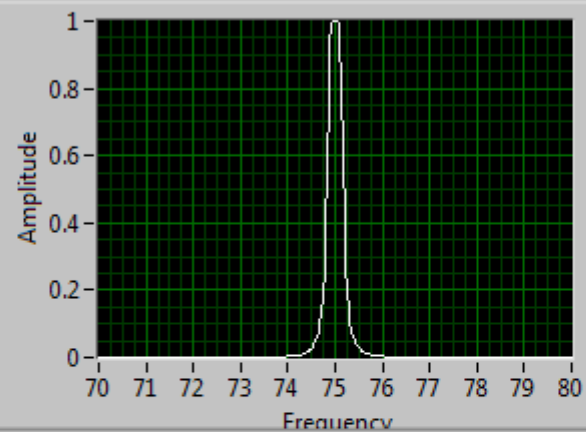


Filtered Signal

RMS 0.60



Filter Response



Signal Parameters

Signal
Frequency (Hz)

75

Signal Amplitude

1

Modulation
Frequency (Hz)

5

☐ 60Hz Comb
Noise

☐ White Noise
[SD=1, 0.045/Hz^{0.5}]

Bandpass Filter Parameters

Filter Order

3

High Pass Cutoff (Hz)

84.000

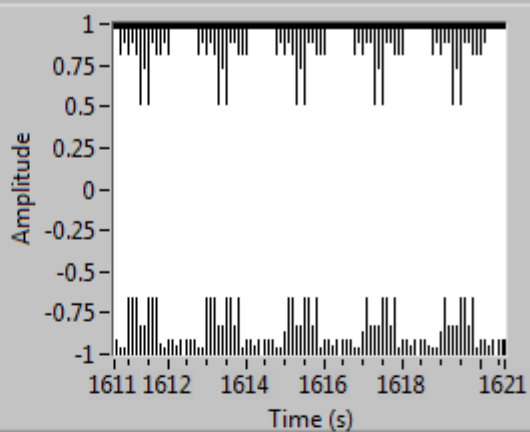
Low Pass Cutoff (Hz)

66.000

STOP

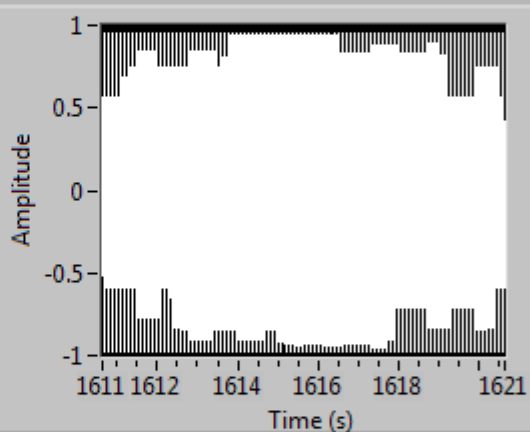
Unfiltered Signal

RMS 0.30

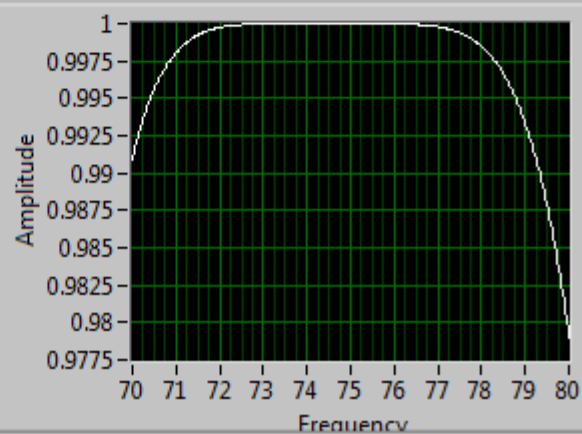


Filtered Signal

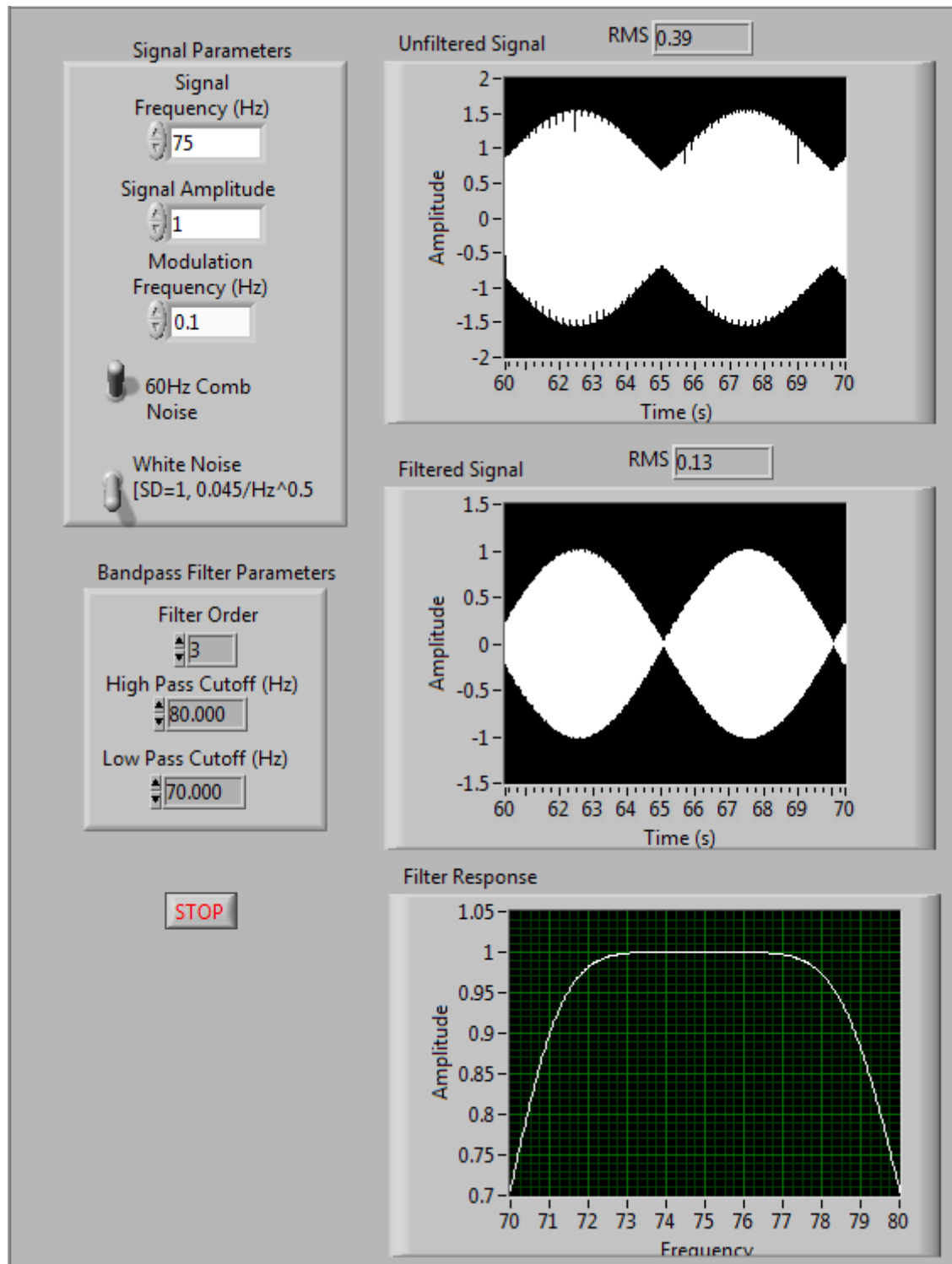
RMS 0.62



Filter Response



Problem 2



Signal Parameters

Signal
Frequency (Hz)

75

Signal Amplitude

0.1

Modulation
Frequency (Hz)

0.1

60Hz Comb
Noise

White Noise
[SD=1, 0.045/Hz^{0.5}]

Bandpass Filter Parameters

Filter Order

3

High Pass Cutoff (Hz)

80.000

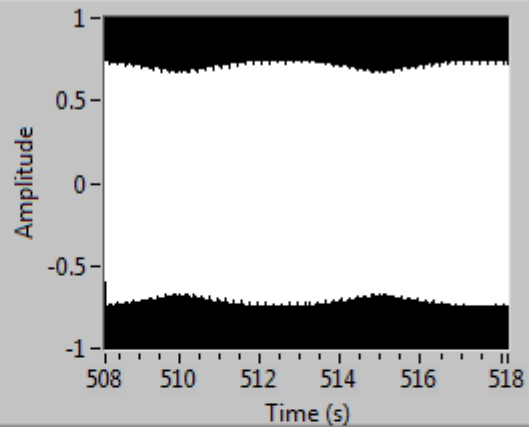
Low Pass Cutoff (Hz)

70.000

STOP

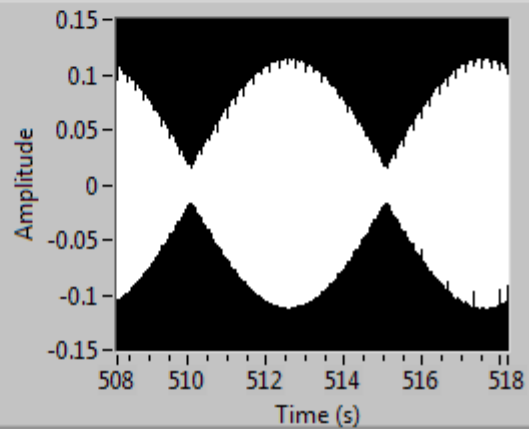
Unfiltered Signal

RMS 0.40

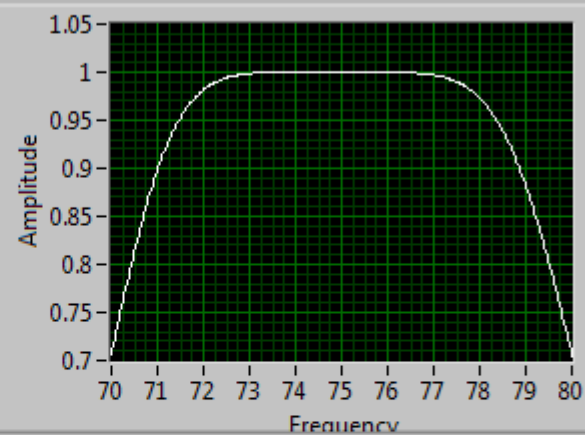


Filtered Signal

RMS 0.07



Filter Response



Signal Parameters

Signal
Frequency (Hz)

75

Signal Amplitude

0.2

Modulation
Frequency (Hz)

0.1

60Hz Comb
Noise

White Noise
[SD=1, 0.045/Hz^{0.5}]

Bandpass Filter Parameters

Filter Order

3

High Pass Cutoff (Hz)

80.000

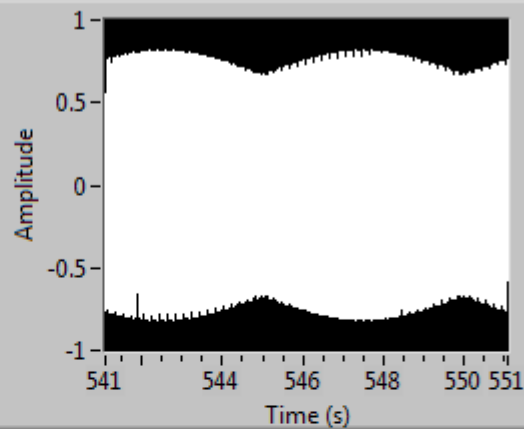
Low Pass Cutoff (Hz)

70.000

STOP

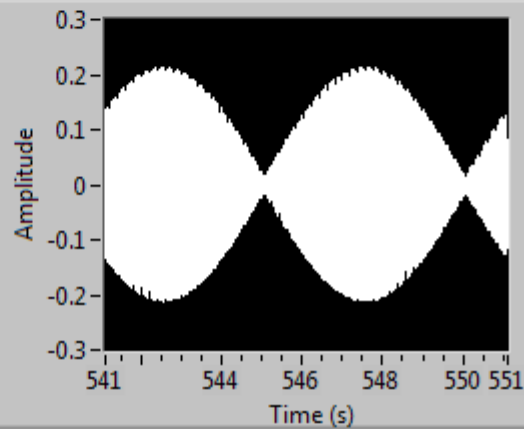
Unfiltered Signal

RMS 0.40

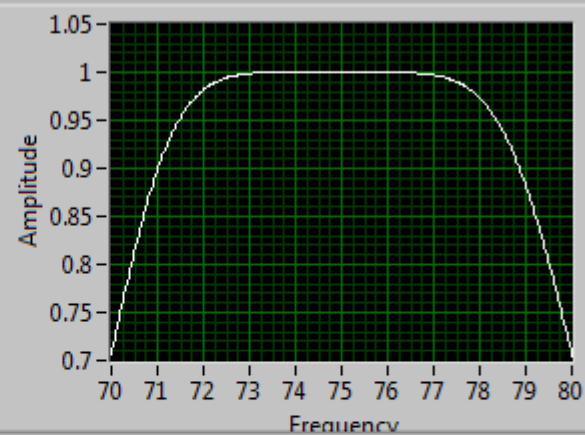


Filtered Signal

RMS 0.09



Filter Response



Signal Parameters

Signal
Frequency (Hz)

75

Signal Amplitude

0.05

Modulation
Frequency (Hz)

0.1

60Hz Comb
Noise

White Noise
[SD=1, 0.045/Hz^{0.5}]

Bandpass Filter Parameters

Filter Order

3

High Pass Cutoff (Hz)

80.000

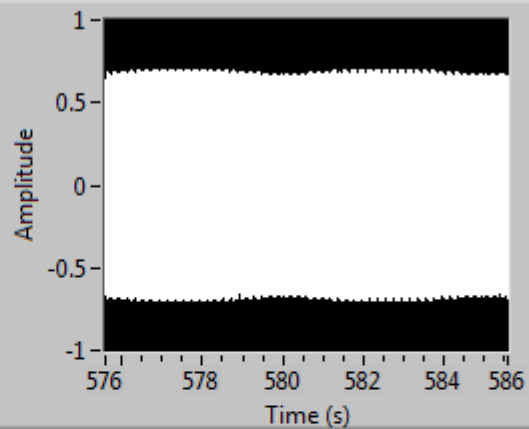
Low Pass Cutoff (Hz)

70.000

STOP

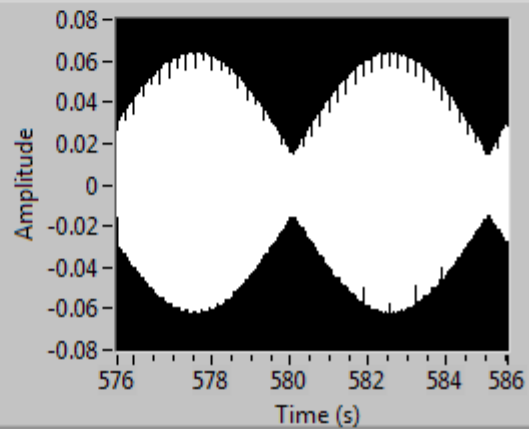
Unfiltered Signal

RMS 0.40

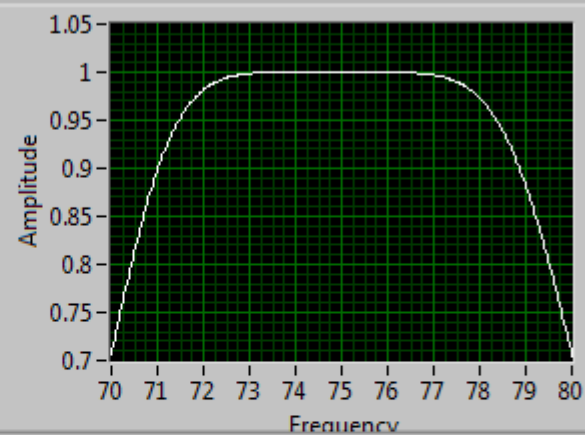


Filtered Signal

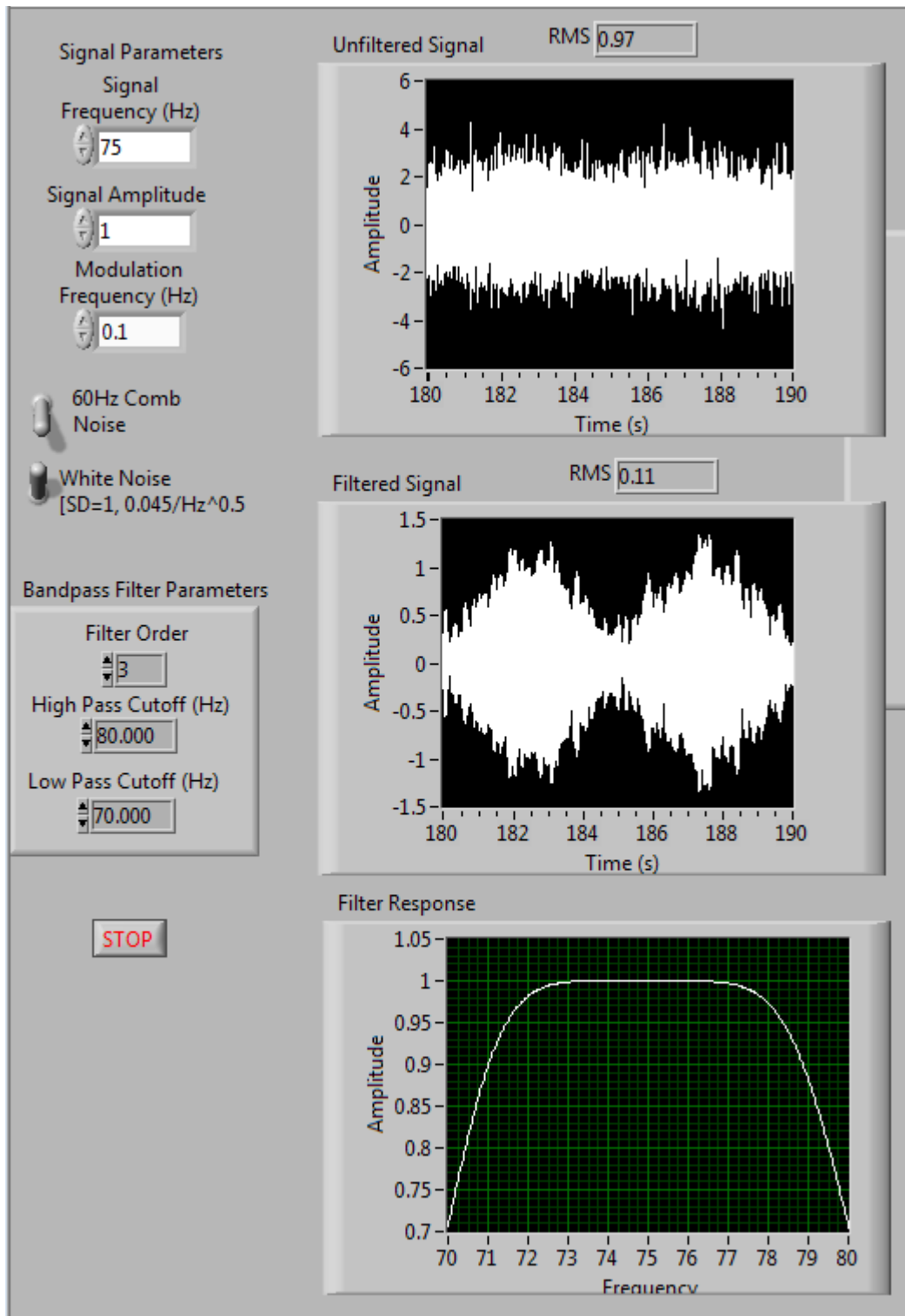
RMS 0.01



Filter Response



Problem 3



Signal Parameters

Signal
Frequency (Hz)

75

Signal Amplitude

1

Modulation
Frequency (Hz)

0.1

☐ 60Hz Comb
Noise

☐ White Noise
[SD=1, 0.045/Hz^{0.5}]

Bandpass Filter Parameters

Filter Order

3

High Pass Cutoff (Hz)

75.500

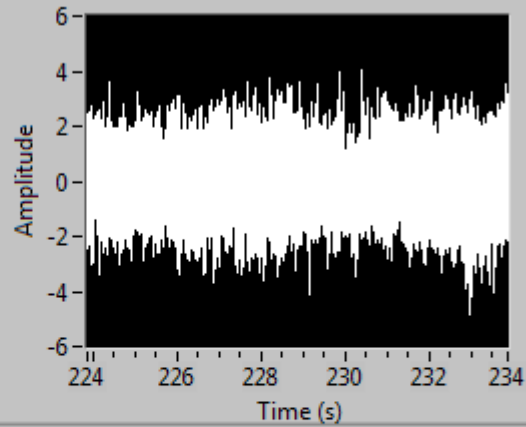
Low Pass Cutoff (Hz)

74.500

STOP

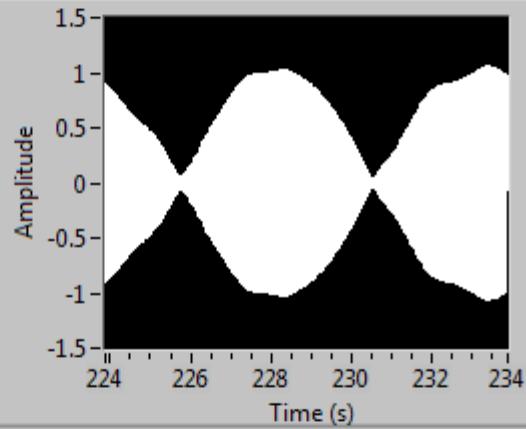
Unfiltered Signal

RMS 1.04

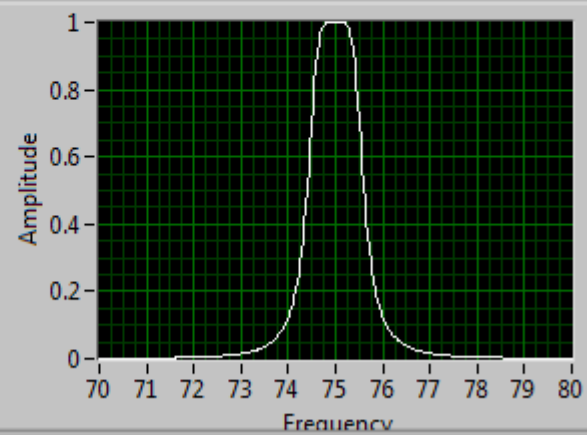


Filtered Signal

RMS 0.70



Filter Response



Signal Parameters

Signal
Frequency (Hz)

75

Signal Amplitude

1

Modulation
Frequency (Hz)

0.1

60Hz Comb
Noise

White Noise
[SD=1, 0.045/Hz^{0.5}]

Bandpass Filter Parameters

Filter Order

3

High Pass Cutoff (Hz)

75.050

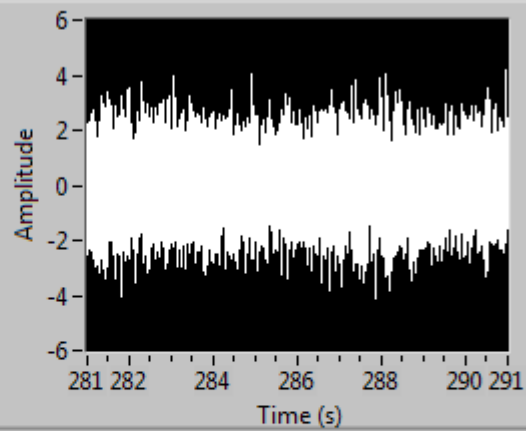
Low Pass Cutoff (Hz)

74.950

STOP

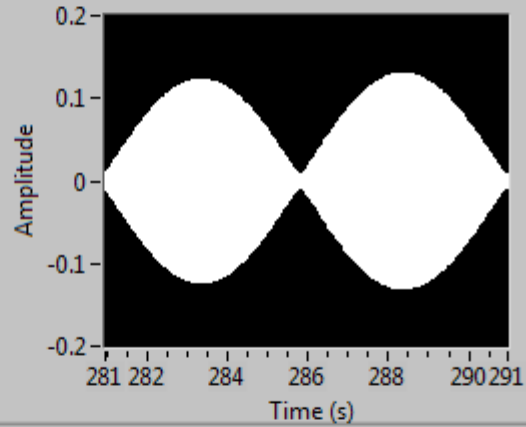
Unfiltered Signal

RMS 1.15

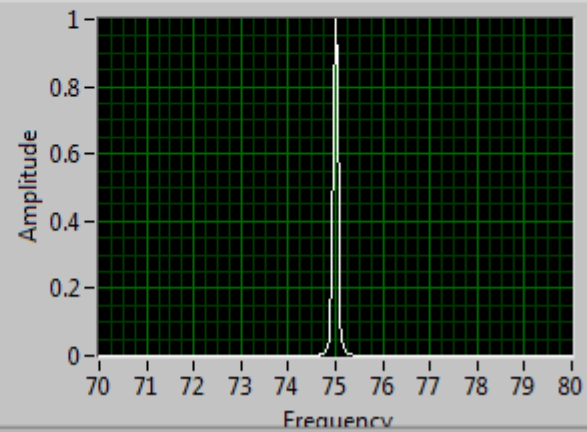


Filtered Signal

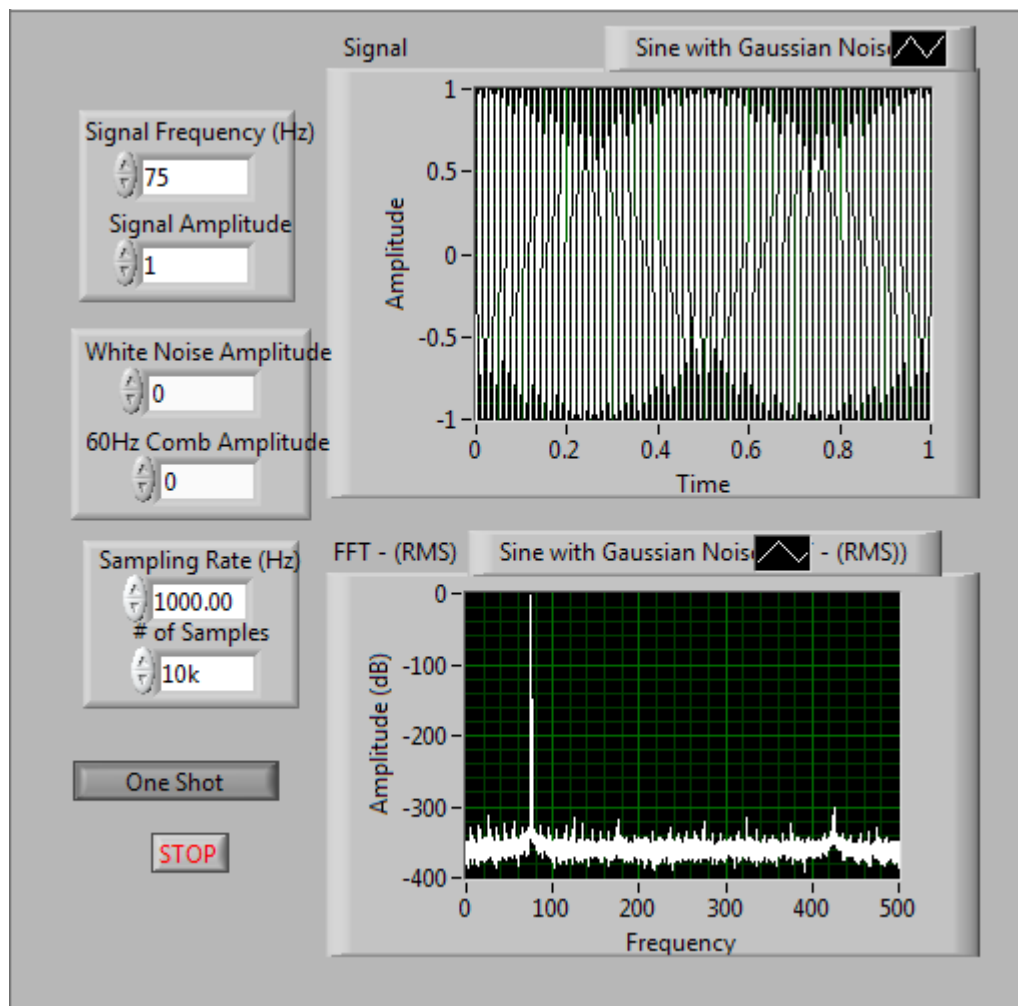
RMS 0.01



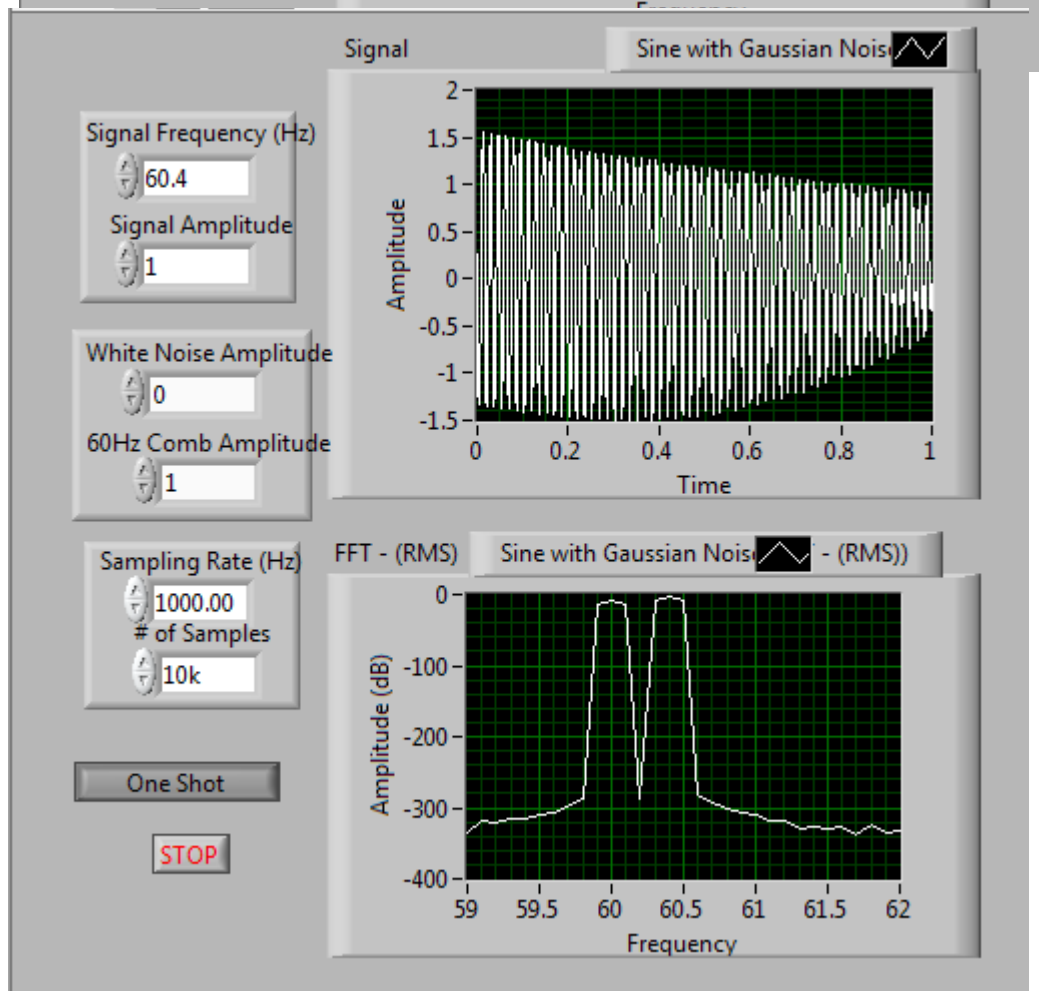
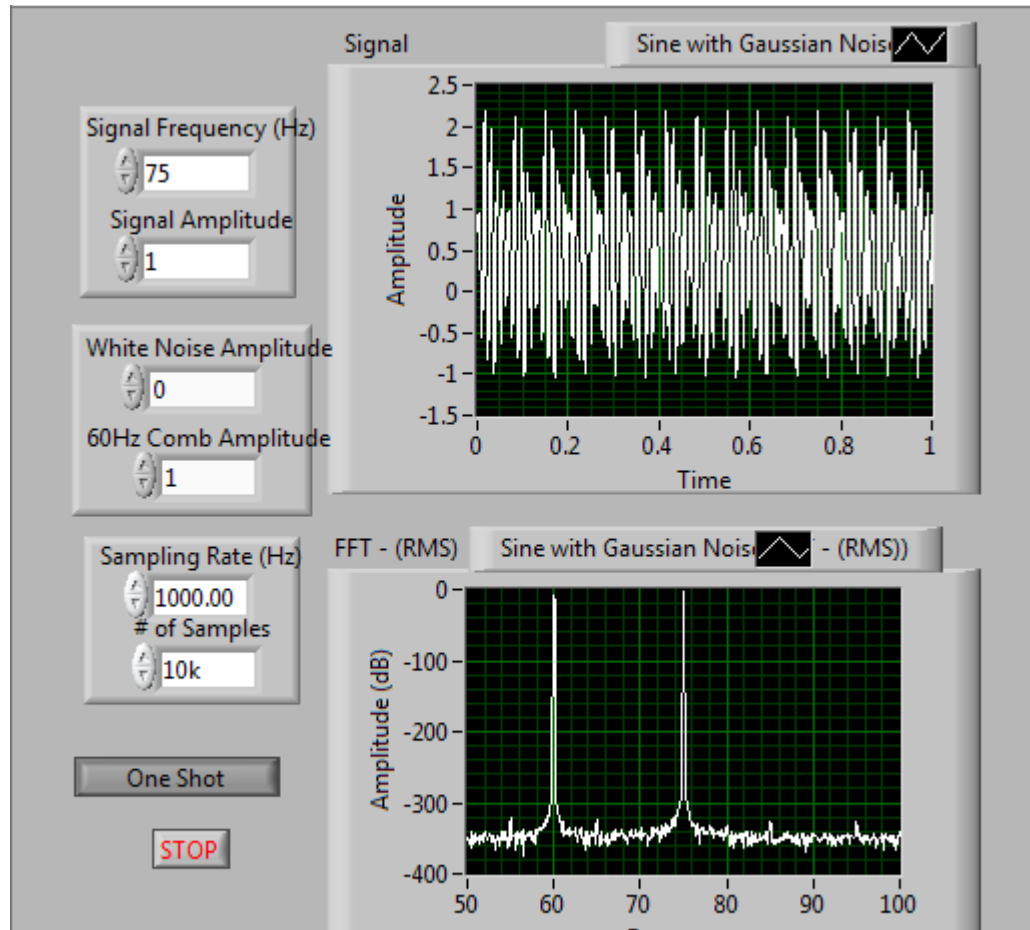
Filter Response



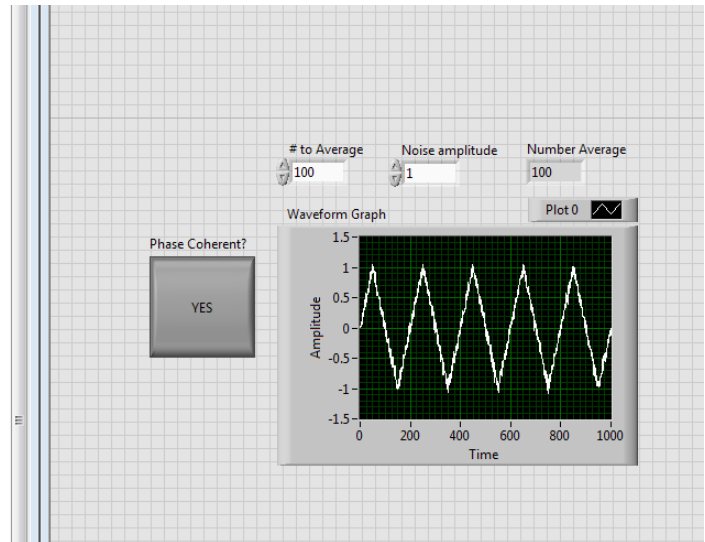
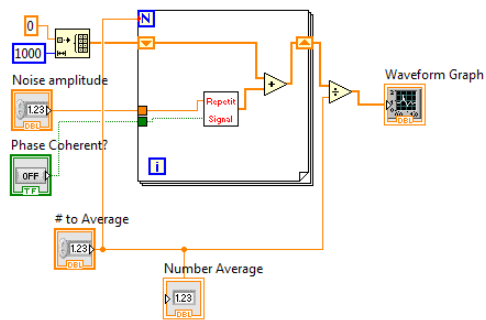
Problem 5:



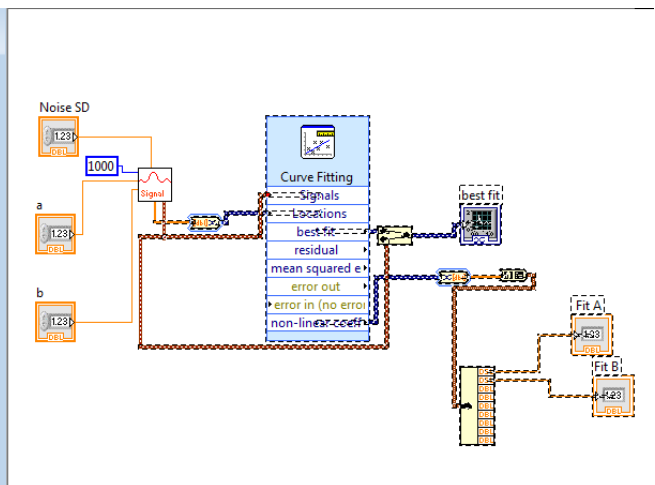
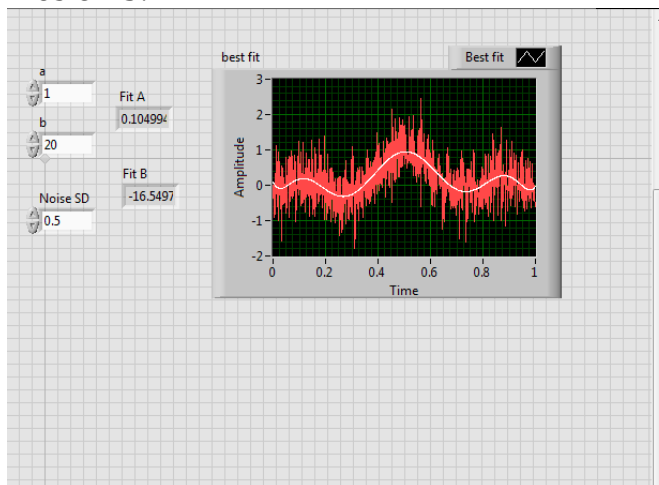
Problem 6:



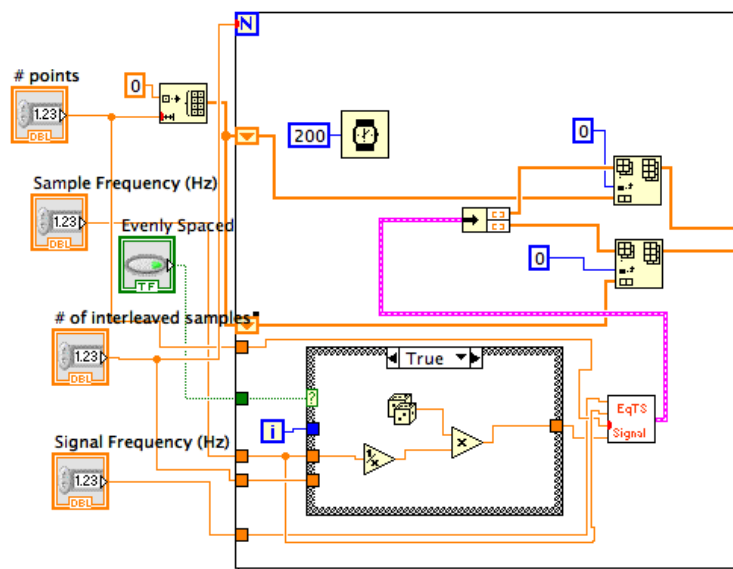
Problem 8:

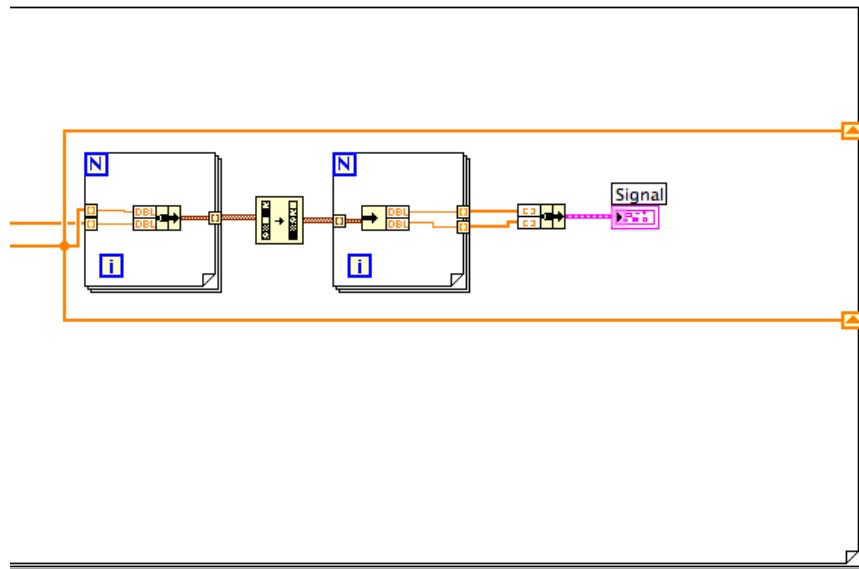


Problem 9:



Problem 10:





Problem 11:

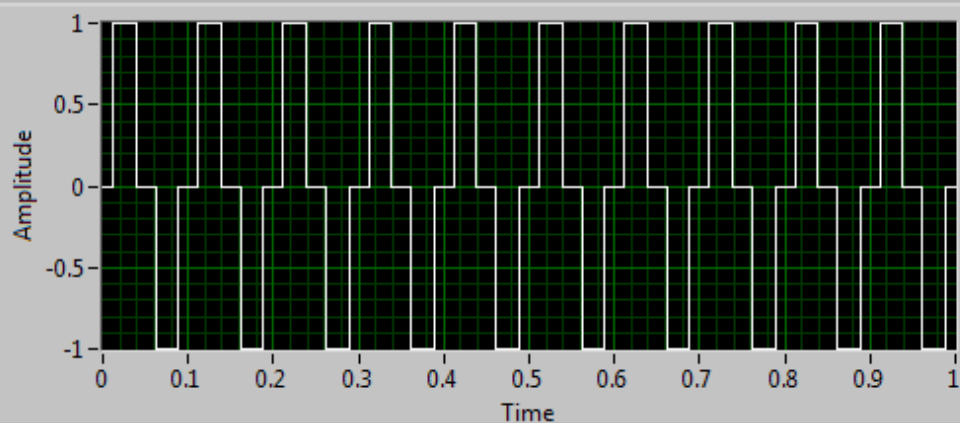
Original Waveform

Noise Amplitude

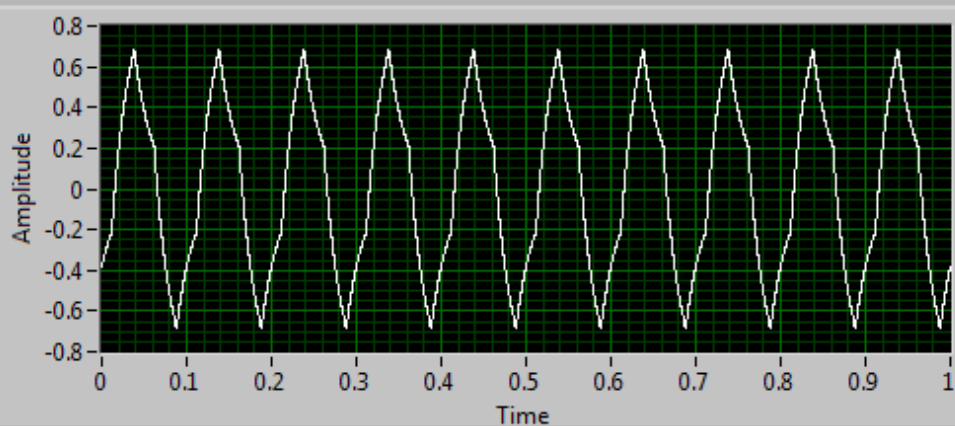
0

Signal Amplitude

0.75



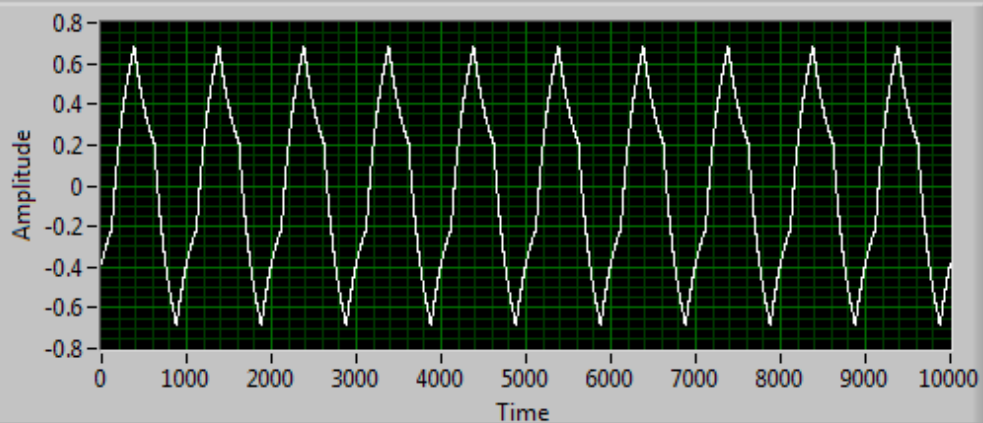
Filtered Waveform



Filtered, Averaged

to Average

0



Noise Amplitude



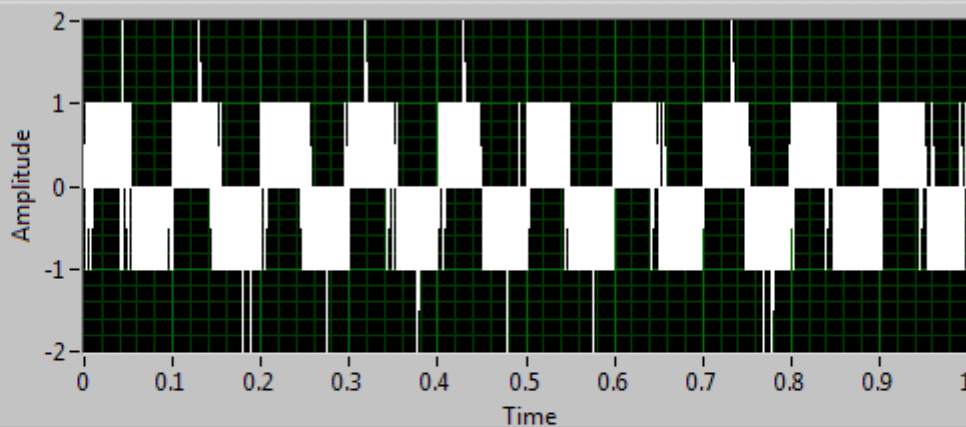
0.3

Signal Amplitude

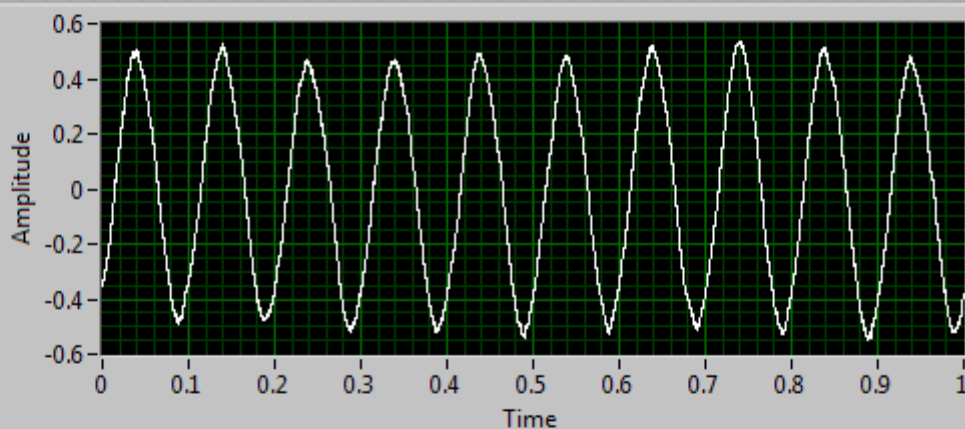


0.75

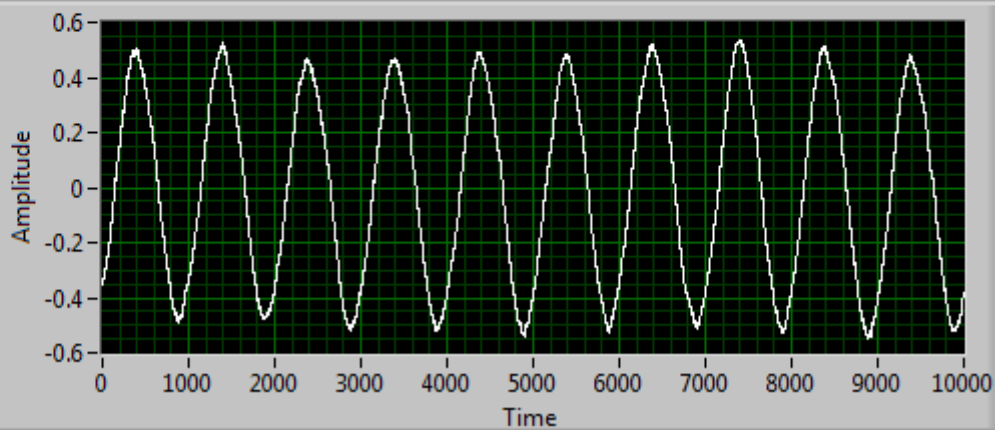
Original Waveform



Filtered Waveform



Filtered, Averaged



to Average



0

Original Waveform

Noise Amplitude

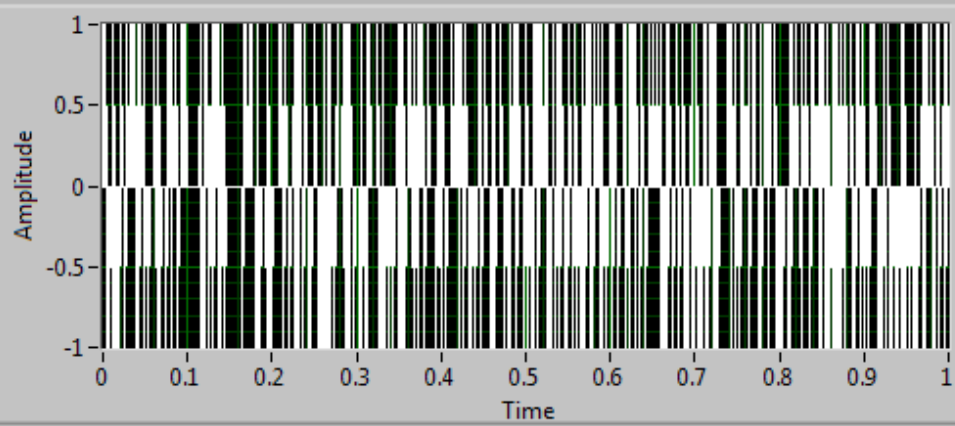


0.25

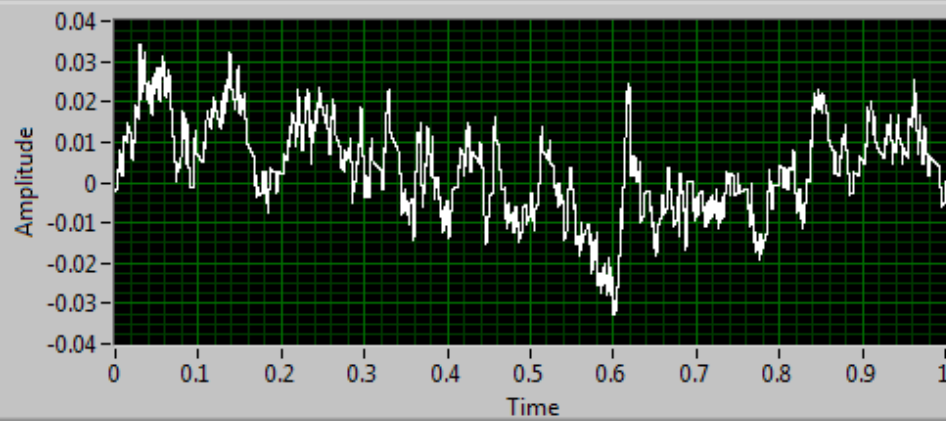
Signal Amplitude



0.01



Filtered Waveform

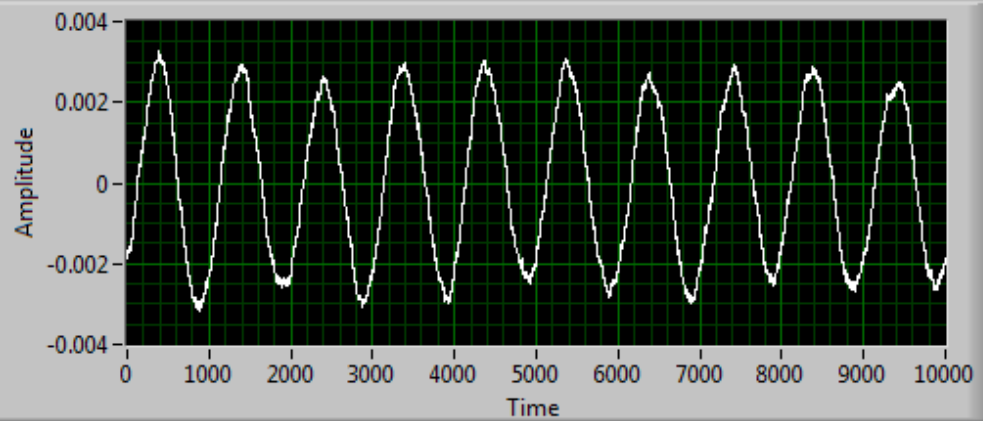


Filtered, Averaged

to Average



1000



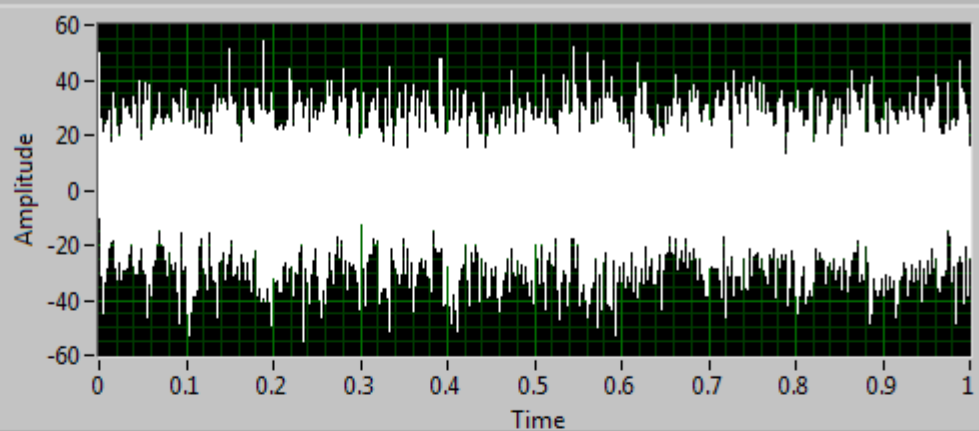
Noise Amplitude

15

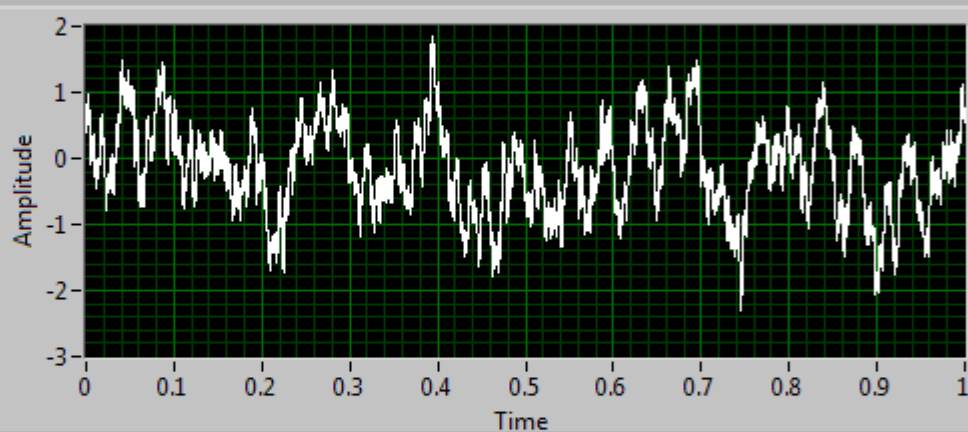
Signal Amplitude

0.1

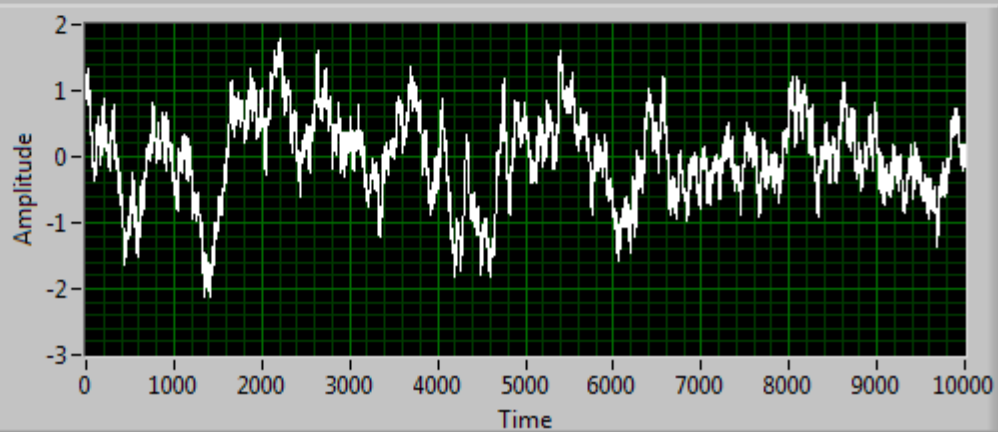
Original Waveform



Filtered Waveform



Filtered, Averaged



to Average

0

Noise Amplitude



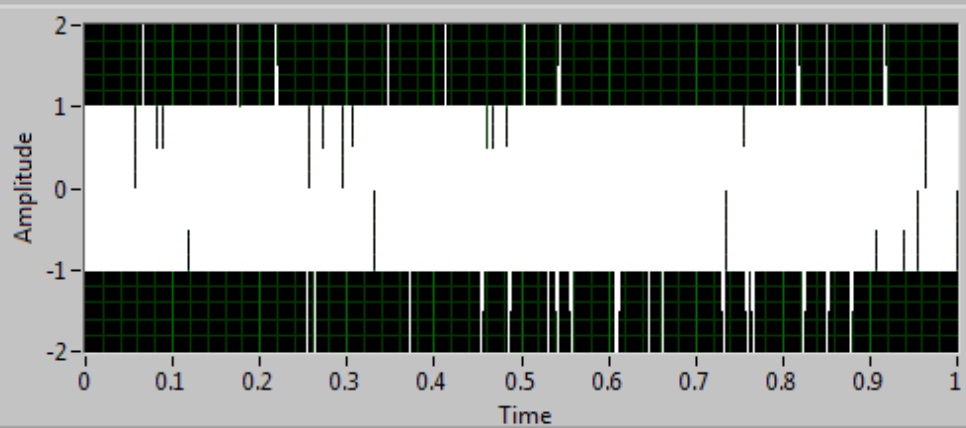
0.5

Signal Amplitude

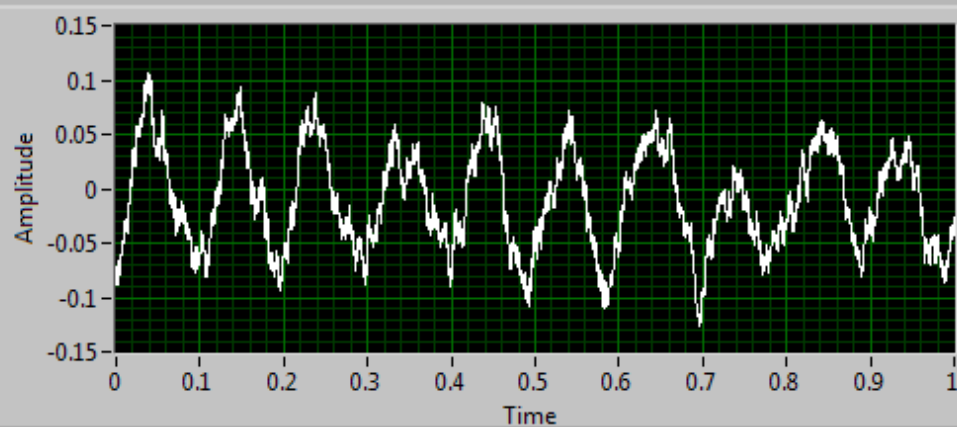


0.1

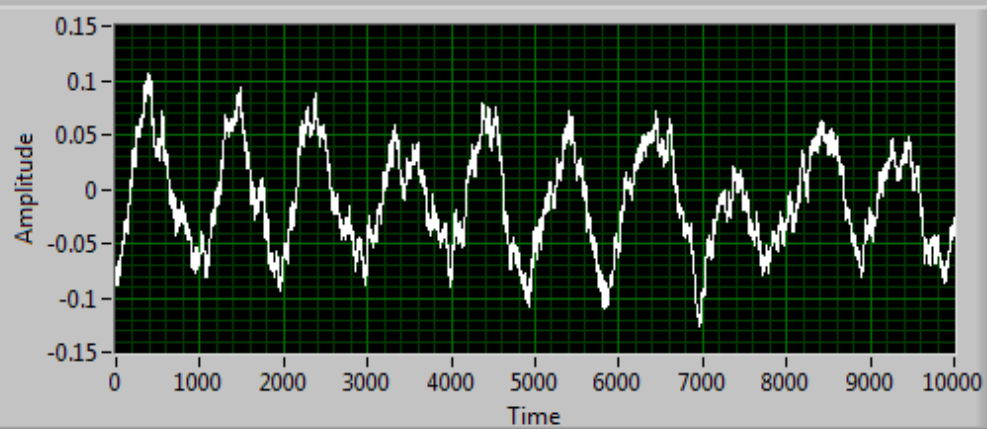
Original Waveform



Filtered Waveform



Filtered, Averaged



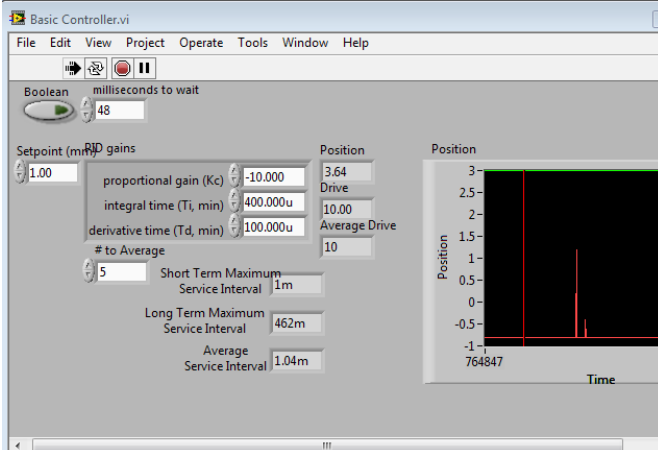
to Average



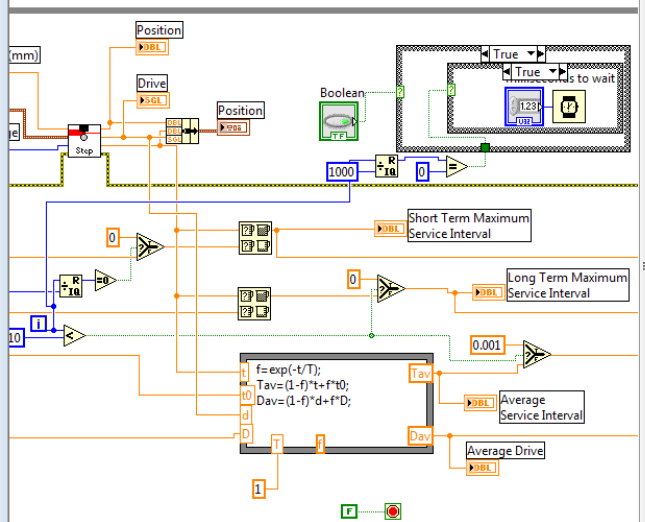
0

Problem 13:

the Levitator can hold the ball. Now watch the Chart on the vi. The white curve shows the position of the ball. The green



interval before the ball drops. Now add code that inserts a delay every time you push a front panel Boolean control. How long a time delay can the Levitator now tolerate? Why is the maximum tolerable continuous delay different from the maximum tolerable intermittent delay? Calculate how long is



Problem 15:

