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Registration # *

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What is filtering? How and why do we use filtering in DSP. 6/10

Filtering is used to remove noise from a signal. We can filter a signal using moving average filter by taking some value for m and as we increase the value of m the filter will improve but after some value of m it will start to lose data so we should avoid going beyond that value.

Write MATLAB code that implement 5 point moving average filter and pass a noisy sinusoid from it. Find whether the 5 point moving average filter is stable or unstable. 15/20

```
clc
clear all
close all
f = 15;
fs = 1000;
t = 0:1/fs:1;
noise = 1+2*rand(size(t));
signal = sin(2*pi*f*t);
x = signal+noise;
subplot(2,1,1);
plot(t,x);
title('Noisy Signal');
m=5
b = (1/m)*ones(1,m);
y = filter(b,1,x);
subplot(2,1,2)
plot(t,y);
title("Filtered Signal");
```

5 point moving average filter is stable because it filters the signal and signal data is also not lost.

What values of M must not be taken for a moving average and why? Elaborate your answer with example. 18/20

values for M greater than fs/2 must not be taken as these large values can result in distortion of the signal, If we want to filter a signal correctly, the value of M should be less than fs/2. If it is greater than that then we will not get satisfactory results.