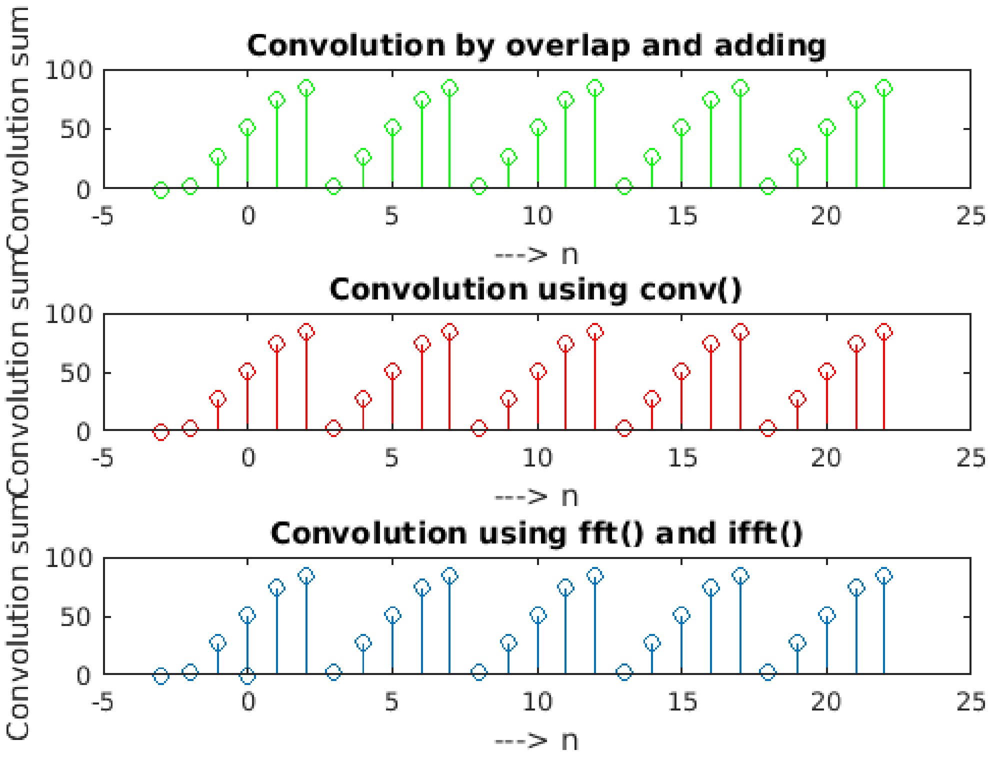
```
clear;
clc;
% x[n] = [0 1 2 3 4] from n = 0
% in code y[n]=[x x x x x] is denoted as x
x = [0 1 2 3 4]
x = [ x x x x x ] % y
h = [ 3 21]   % h
ax = -1      % starting point of y
ah = -2      % starting point of h

% selecting the final start point
a = ax+ah;

% a) first part of solution

m = length(x);
n = length(h);
x1 = [x,zeros(1,n)];
h1 = [h,zeros(1,m)];


% c overlap and adding method
% number of terms after convolution n + m - 1
for i = 1:m+n-1
    Y(i)=0; % defining the i'th term 0 initially
    for j = 1:m % for all the terms in x
        if(i-j+1>0) % but not the terms which are not overlapped
            Y(i) = Y(i) + x1(j)*h1(i-j+1); % summation to Y and H is
 flipped
        end
    end
end

% defining the x axis for the the convolution solution
xaxis = a:a+numel(Y)-1;

% plotting
subplot(3,1,1)
stem(xaxis,Y,'g')
ylabel('Convolution sum')
xlabel('---> n')
title('Convolution by overlap and adding')

%a

% conv(X,H) is the default function for the convolution of two signals
subplot(3,1,2)
stem(xaxis,conv(x,h),'r')
ylabel('Convolution sum')
xlabel('---> n')
title('Convolution using conv()')
```

```
% fft() and ifft() are periodic DFT but since sufficient padding with
 zeros is done linear convolution can be calculated. But they have one
 element extra on the end
subplot(3,1,3)
stem([xaxis 0],real(ifft(fft(x1).*fft(h1))))
title('Convolution using fft() and ifft()')
xlabel('---> n')
ylabel('Convolution sum')
```

```

x =

     0     1     2     3     4


x =

  Columns 1 through 13

     0     1     2     3     4     0     1     2     3     4     0
 1     2

  Columns 14 through 25

     3     4     0     1     2     3     4     0     1     2     3
  4


h =

     3    21


ax =

    -1


ah =

    -2
```



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