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Problem Statement 1:Plotting of functions as per question

Program Initialization

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

Signal Generation Segment: $x[n]$

```
n=-2:2;  
stepfn=stepsignal(1,min(n),max(n));  
% function [xofn,index]=stepsignal(sindex,lindex,rindex)  
% index=[lindex:rindex];  
% xofn=[(index-sindex)>=0];  
% end  
impulsefn=impulsesignal(-1,min(n),max(n));  
% function [xofn,index]=impulsesignal(sindex,lindex,rindex)  
% index=[lindex:rindex];  
% xofn=[(index-sindex)==0];  
% end  
x=stepfn+impulsefn;
```

Generation of signal flipped in time: $x[-n]$

```
[xflip,nflip]=xreflected(x,n);  
% function [xnew, nnew] = xreflected(xold, nold)  
% xnew = fliplr(xold);  
% nnew = -fliplr(nold);  
% end
```

Generation of time-shifted signal: $x[n-2]$

```
[xshift, nshift]=xshifted (x,n,2);
% function[xnew, nnew] = xshifted (xold, nold, n0)
% nnew = nold + n0;
% xnew = xold;
% end
```

Addition of signals: $x[n]$ and $x[-n]$

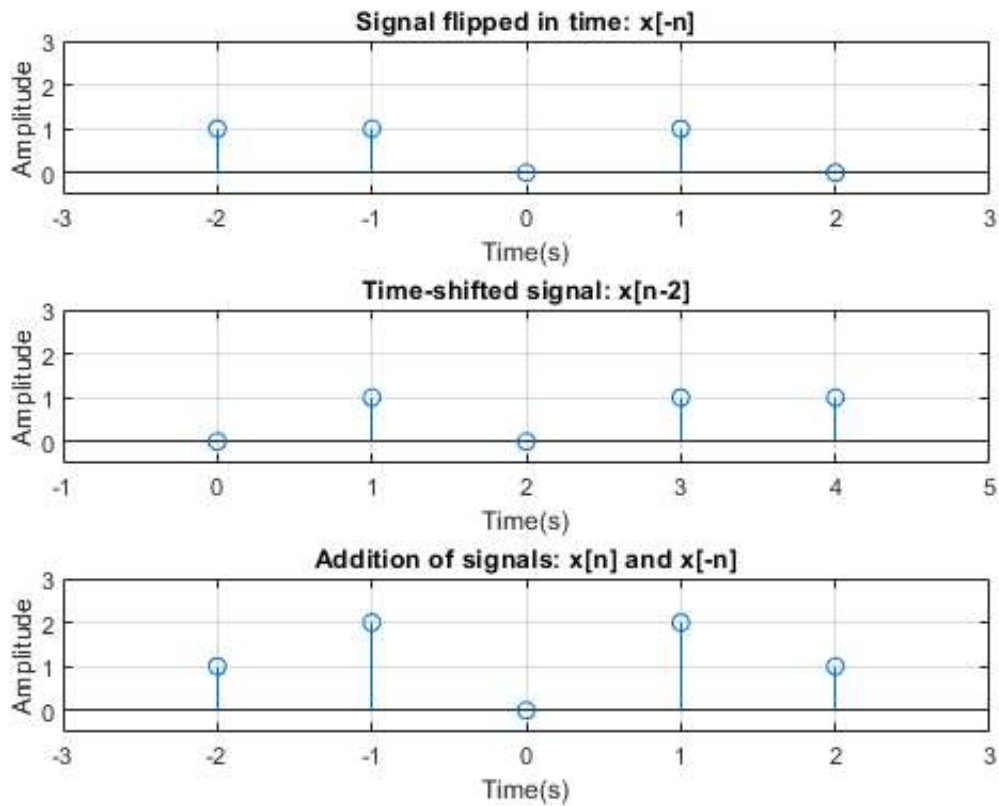
```
[xadd, nadd]=x1plusx2 (x,xflip,n,nflip);
% function[x, n] = x1plusx2 (x1orig, x2orig, n1orig, n2orig)
% n = min(min(n1orig), min(n2orig)): max(max(n1orig), max(n2orig));
% x1i = zeros(1, length(n));
% x2i= x1i;
% x1i (find( (n >= min(n1orig)) & (n <= max(n1orig)) == 1))= x1orig;
% x2i (find( (n >= min(n2orig)) & (n <= max(n2orig)) == 1))= x2orig;
% x = x1i+ x2i;
% end
```

Plotting results

```
figure(1)
subplot(3,1,1)
stem(nflip,xflip);
xlabel('Time(s)');
ylabel('Amplitude');
title('Signal flipped in time:  $x[-n]$ ');
axis([-3 3 -0.5 3]);
grid on

subplot(3,1,2)
stem(nshift,xshift);
xlabel('Time(s)');
ylabel('Amplitude');
title('Time-shifted signal:  $x[n-2]$ ');
axis([-1 5 -0.5 3]);
grid on

subplot(3,1,3)
stem(nadd,xadd);
xlabel('Time(s)');
ylabel('Amplitude');
title('Addition of signals:  $x[n]$  and  $x[-n]$ ');
axis([-3 3 -0.5 3]);
grid on
```



Problem Statement 2: Cross Correlation between two finite length sequences

Program Initialization

```
clc;
clear all;
```

Taking input from user

```
e=0;
while e==0
    prompt="Enter first sequence:\n";
    seq1=[1;2;3;4];
    prompt="Enter second sequence:\n";
    seq2=[1;2;3;4];
    if length(seq1)~=length(seq2)
        disp("Please enter sequences of equal length!");
    else
        e=1;
    end
end
seqcorr=correlation_fun(seq1,seq2);
% function xcorr=correlation_fun(x1,x2)
% len1=length(x1);
% len2=length(x2);
% xcorr=zeros(len1+len2-1,1);
% for i=-len2+1:1:len1
%     x2s=xshifted (x2,len2,i);
```

```

%     if i>0
%         x2s=[zeros(i-1,1);x2s];
%         x2s=x2s(1:len2,1);
%         x1mod=x1;
%     elseif i<=0
%         x1mod=[zeros(abs(i),1);x1];
%         x1mod=x1mod(1:len1,1);
%         x2s=x2;
%     end
%     xcorr(i+len2)=sum(x1mod.*x2s);
% end
% xcorr=[xcorr(1:ceil(length(xcorr)/2)-1);xcorr(ceil(length(xcorr)/2)+1:end)];
% end
disp(seqcorr);
disp(xcorr(seq1,seq2));

```

```

4
11
20
30
20
11
4

```

```

4.0000
11.0000
20.0000
30.0000
20.0000
11.0000
4.0000

```