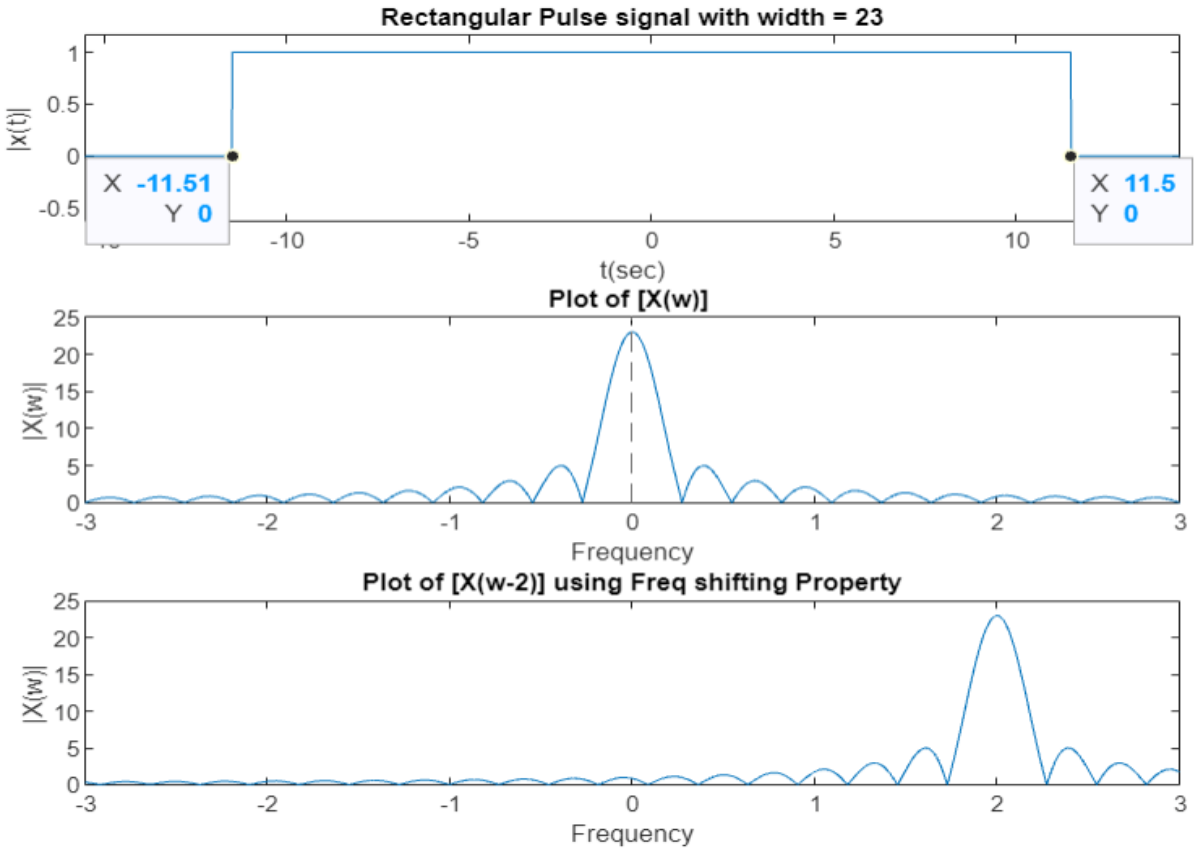
Input

```
clear;
clc;
syms t1 w1 t w;
subplot(3,1,1);
time=-23:0.01:23;
T = 23;
rec = rectpuls(time, T);
plot(time,rec);
axis([-15 15 -0.3 1.5]);
title('Rectangular Pulse signal with width = 23');
ylabel('|x(t)|');
xlabel('t(sec)');
subplot(3,1,2);
x= 1 * exp(-1i*w*t);
FT_x = simplify(abs(int(x,t,-11.5,11.5)));
fplot(FT_x);
title("Plot of [X(w)] ");
xlabel("Frequency");
ylabel("|X(w)|");
axis([-3,3,-0.1,25]);
subplot(3,1,3);
x1=1;
w0=2;
xt= exp(1i*w0*t1)* x1 * exp(-1i*w1*t1) ;
Xf=simplify(abs(int(xt,t1,-11.5,11.5)));
fplot(Xf);
title("Plot of [X(w-2)] using Freq shifting Property");
xlabel("Frequency");
ylabel("|X(w)|");
axis([-3,3,-0.1,25]);
```

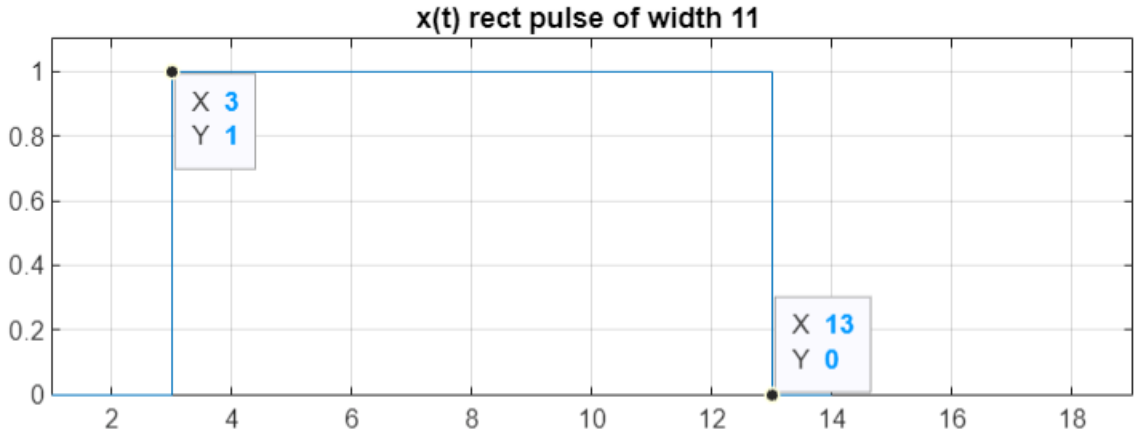
Output

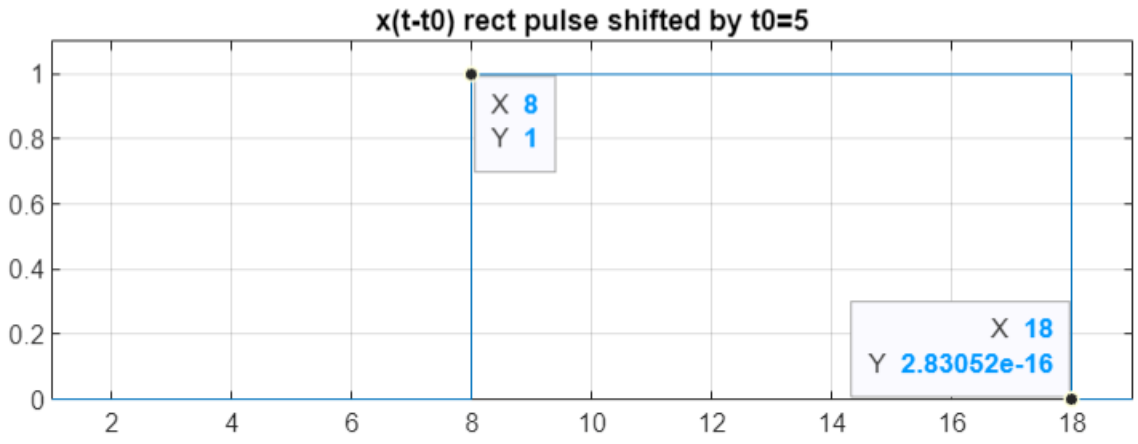


Input

```
clc;
clear;
close all;
% Define the parameters
N = 10;      % Width of the pulse
K = 2;       % Number of zeros before and after the pulse
P = 32;      % P is the smallest power of 2 greater than 2*N
t0 = 5;       % Number of points to shift by
% Step a: Construct DFTY2
X1 = [zeros(1, K) ones(1, N) zeros(1, K)];
DFTX1 = fftshift(fft(X1, P));
DFTY2 = DFTX1 .* exp (-1*1i*t0*(2*pi/P)*(1:P));
% Step b: Compute the IDFT of DFTY2
Y2 = ifft(DFTY2);
disp(length(P));
disp(length(X1));
% Plot the results
figure;
subplot(2,1,1);
stairs(abs(X1));
title('x(t) rect pulse of width 11 ');
axis([1,19,0,1.1]);
subplot(2,1,2);
stairs(abs(Y2));
title('x(t-t0) rect pulse shifted by t0=5');
axis([1,19,0,1.1]);
```

Output

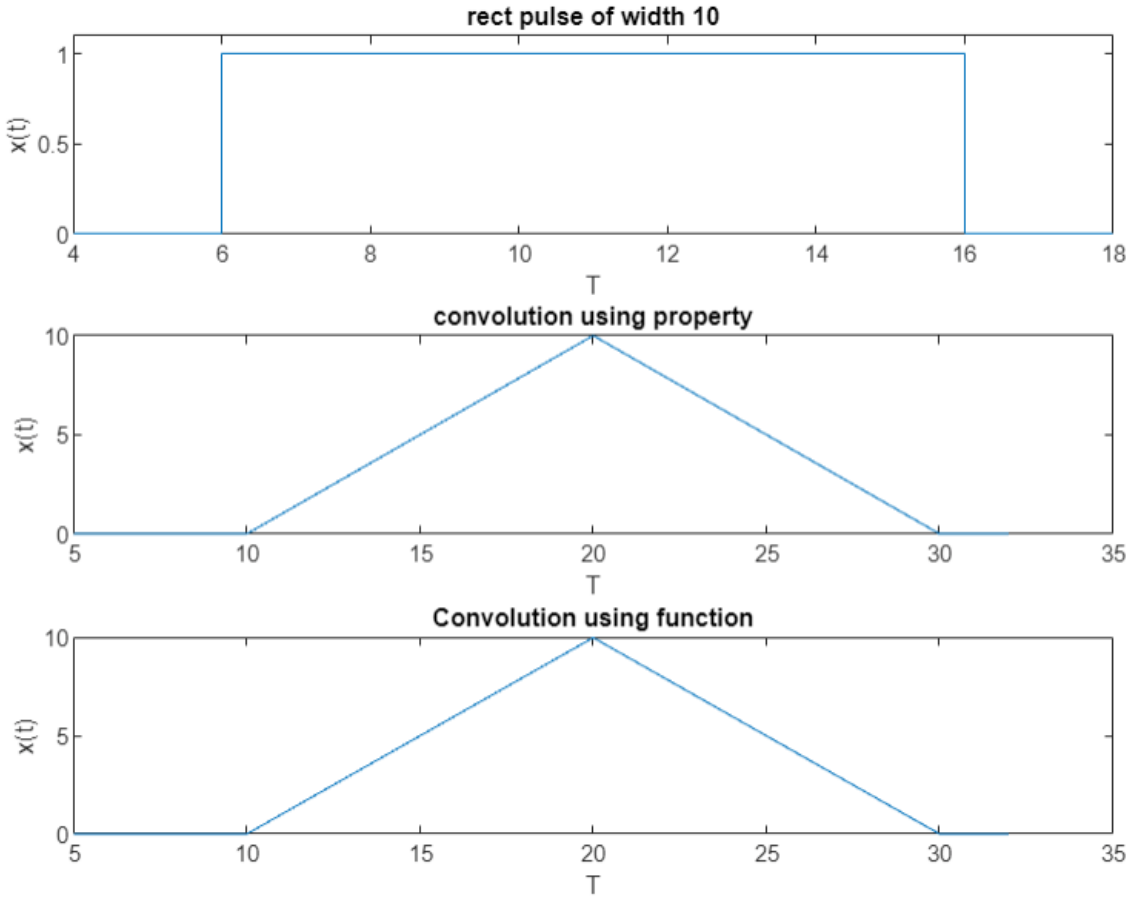




INPUT

```
% Plot the rectangular pulses
N = 10; % Width of the pulse
K = 5; % Number of zeros before and after the pulse
X1 = [zeros(1, K) ones(1, N) zeros(1, K)];
X2 = [zeros(1, K) ones(1, N) zeros(1, K)];
subplot(3,1,1)
stairs(X1);
xlabel('T');
ylabel('x(t)');
title('rect pulse of width 10');
axis([4,18,0,1.1]);
% Calculate fourier transform of both signals and multiply them
P = 32; % P is the smallest power of 2 greater than 2*N
DFTX1 = fft(X1, P);
DFTX2 = fft(X1, P);
DFTY = DFTX1 .* DFTX2;
% Compute the Inverse Fourier transform of DFTY
Y1 = ifft(DFTY);
% Convolve X1 and X2 and compare with Y1
Y2 = conv(X1, X2);
Y2 = Y2(1:length(Y1));
error = norm(Y1 - Y2);
% Plot Y1
t = 1:length(Y1);
subplot(3,1,2);
plot(t, Y1);
xlabel('T');
ylabel('x(t)');
title('convolution using property');
axis([5,35,0,10]);
% Plot Y2
t = 1:length(Y2);
subplot(3,1,3);
plot(t, Y2);
xlabel('T');
ylabel('x(t)');
title('Convolution using function');
axis([5,35,0,10]);
```

OUTPUT


rect pulse of width 10
x(t)
T
convolution using property
x(t)
T
Convolution using function
x(t)
T