```
%Lab 3


%A.
%1) 2.4pi/2pi = m/n ---> n = 5,  3.2pi/2pi = m/n ---> 5. No = 5
%2) x[n] = 4 cos(2.4πn) + 2 sin(3.2πn)


T = 1/1000; N_0 = 100; n = (0:N_0-1);
x = 4*cos(2.4*pi*n)+ 2*sin(3.2*pi*n);
X = fft(x)/N_0; f = (0:N_0-1)/(T*N_0);
stem(f-1/(2*T),fftshift(abs(X)),'k.');
axis([-500 500 -0.05 3]); xlabel('f [Hz]'); ylabel('|X(f)|');



%3) y[n] = 3abs(cos(pi*n))

y = 3*abs(pi*n);
Y = fft(y)/N_0; f = (0:N_0-1)/(T*N_0);
stem(f-1/(2*T),fftshift(abs(X)),'k.');
axis([-500 500 -0.05 3]); xlabel('f [Hz]'); ylabel('|Y(f)|');



%B.
%1)

N_0 = 32; n = (0:N_0-1); Omega_0 = 2*pi/N_0;
x_n = [ones(1,5) zeros(1,23) ones(1,4)];
for r = 0:N_0-1
    X_r(r+1) = sum(x_n.*exp(-1i*r*Omega_0*n))/N_0;
end

x = real(ifft(X_r)*N_0); stem(n,x,'k.');
axis([0 99 -1.1 1.1]); xlabel('n ); ylabel('x[n]');




%C.
%1)

N_0 = 32; n = (0:N_0-1); Omega_0 = 2*pi/N_0;
x_n = [ones(1,5) zeros(1,23) ones(1,4)];
for r = 0:N_0-1
    X_r(r+1) = sum(x_n.*exp(-1i*r*Omega_0*n))/N_0;
end
r = n; stem(r,real(X_r),'k.');
xlabel('r'); ylabel('X_r'); axis([0 31 -.1 0.3]);
```