%part 4.1

xx = 255\*(rem(1:159,30)>19);

bb = [1,-1];

yy = firfilt(bb,xx);

n1 = 1:length(xx); %length of xx is 159

n2 = 1:length(yy); %length of yy is 160, which is one more than xx:

%the fiter adds one more value at the end where only half the filter is on

%the signal and the other half is in "empty space"

subplot(2,1,1);

stem(n1-1, xx(n1))

subplot(2,1,2);

stem(n2-1,yy(n2),'filled') %--Make black dots

xlabel('Time Index (n)')

%the FIR filter shows where transitions between 255 and 0 occur in xx

T = 1;

dd = [];

for i = 1:length(yy)

if abs(yy(i)) >= T

add = true;

dd = [dd add];

else

add = false;

dd = [dd add];

end

end

edges = find(dd>0);

figure

n3 = 1:length(edges); %length of edge locations: 10

stem(n3-1, edges(n3))

xlabel('Time Index (n)')

%The side before the transition is marked as true.