

Lab_07_HW

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4.1.1

```

xx = 255*(rem(1:159,30) > 19);
bk = [1 -1];
yy = firfilt(bk, xx);

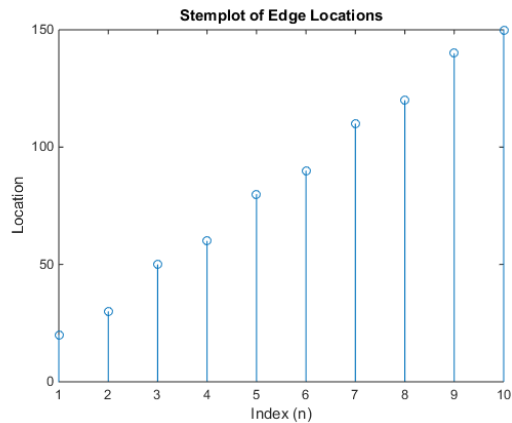
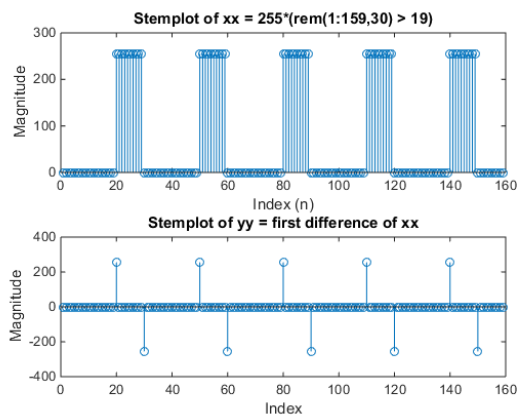
nn = 1:length(xx);
subplot(2,1,1)
stem(nn, xx(nn));
title('Stemplot of xx = 255*(rem(1:159,30) > 19)');
xlabel('Index (n)');
ylabel('Magnitude');
subplot(2,1,2)
stem(nn, yy(nn));
title('Stemplot of yy = first difference of xx');
xlabel('Index');
ylabel('Magnitude');

yylen = length(xx) + length(bk) - 1;
fprintf('\nLength of yy is %d\n', yylen);

edges = abs(yy)> 0;
edgeloc = find(edges ~= false);
figure
stem(1:length(edgeloc), edgeloc);
title('Stemplot of Edge Locations');
xlabel('Index (n)');
ylabel('Location');

```

Length of yy is 160



4.2.1a

```

bar = imread('HP110v3.png');
[row, col] = size(bar);
mid = floor(row/2);
xbar = double(bar(mid,:));
bk = [1 -1];
ybar = firfilt(bk, xbar);

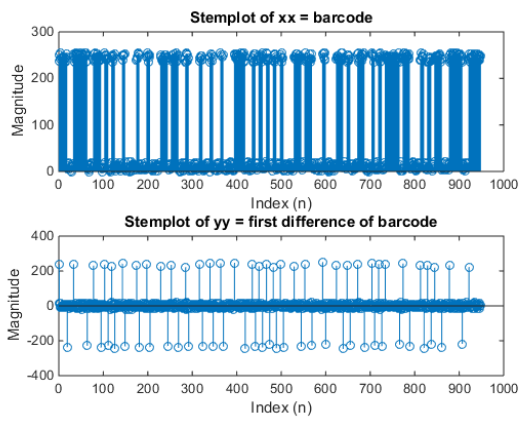
```

4.2.1b

```

nn = 1:length(xbar);
subplot(2,1,1)
stem(nn, xbar(nn));
title('Stemplot of xx = barcode');
xlabel('Index (n)');
ylabel('Magnitude');
subplot(2,1,2)
stem(nn, ybar(nn));
title('Stemplot of yy = first difference of barcode');
xlabel('Index (n)');
ylabel('Magnitude');

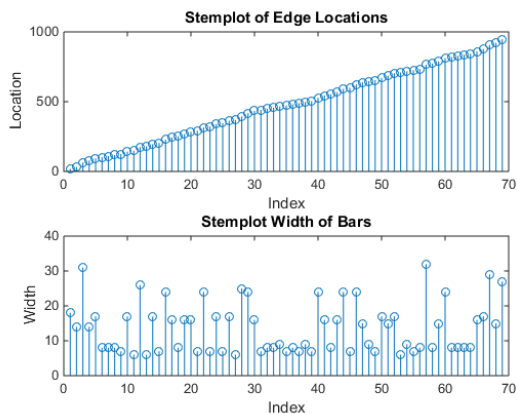
```



4.2.1c & d

```
det = abs(ybar) > 150;
loc = find(det(2:end) ~= false);
figure
subplot(2,1,1);
stem(1:length(loc), loc);
title('Stemplot of Edge Locations');
xlabel('Index');
ylabel('Location');

subplot(2,1,2);
loodelt = firfilt(bk, loc);
stem(1:length(loc), loodelt(1:length(loc)));
title('Stemplot Width of Bars');
xlabel('Index');
ylabel('Width');
```



4.2.1e

```
barwidth = 12*7 + 3*2 + 5*1;
fprintf('Barcode width of 12 digit code is %d\n', barwidth);
```

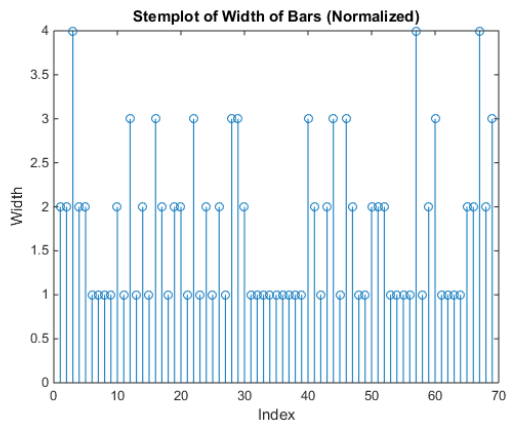
Barcode width of 12 digit code is 95

4.2.1f

```
theta = zeros(1,length(loodelt) - 59);
for i = 1:length(theta)
    theta(i) = sum(loodelt(i:58 + i))/95;
end
thetal = sum(theta)/length(theta);
```

4.2.1g

```
loodeltrel = round(loodelt(1:end-1)/thetal);
figure
stem(1:length(loodeltrel), loodeltrel);
title('Stemplot of Width of Bars (Normalized)');
xlabel('Index');
ylabel('Width');
```



4.2.1h

```
[ss, sloc] = ismember([1,1,1], locdeltrel);
barfilt = locdeltrel(sloc(1):sloc(1) + 58);
barnum = decodeUPC(barfilt);
barnumfin = sum(10.^(length(barnum)-1:-1:0) .* barnum);
```

ssbeg =

1 1 1

4.2.1i

```
fprintf('\nBarcode is: %d\n', barnumfin);
```

Barcode is: 882780450165

4.2.1j

```
bar2num('OFFV3.png');
```

ssbeg =

1 1 1

Barcode is: 46500703089