Table of Contents

q3

```
clc; clear; close all;
addpath(genpath('./materials'))
```

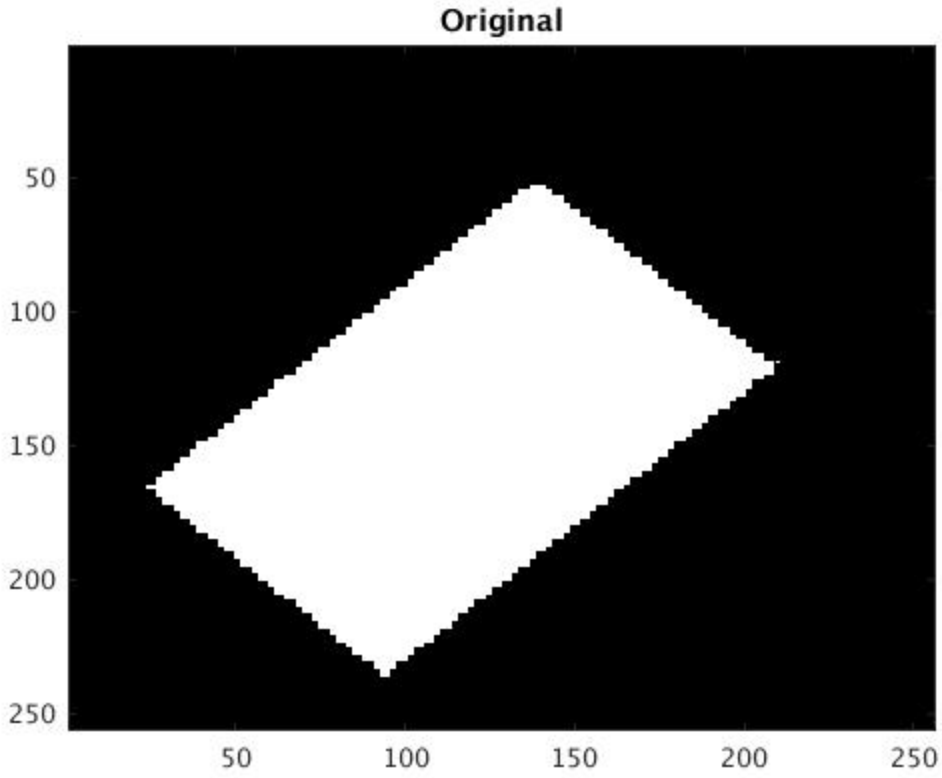
A

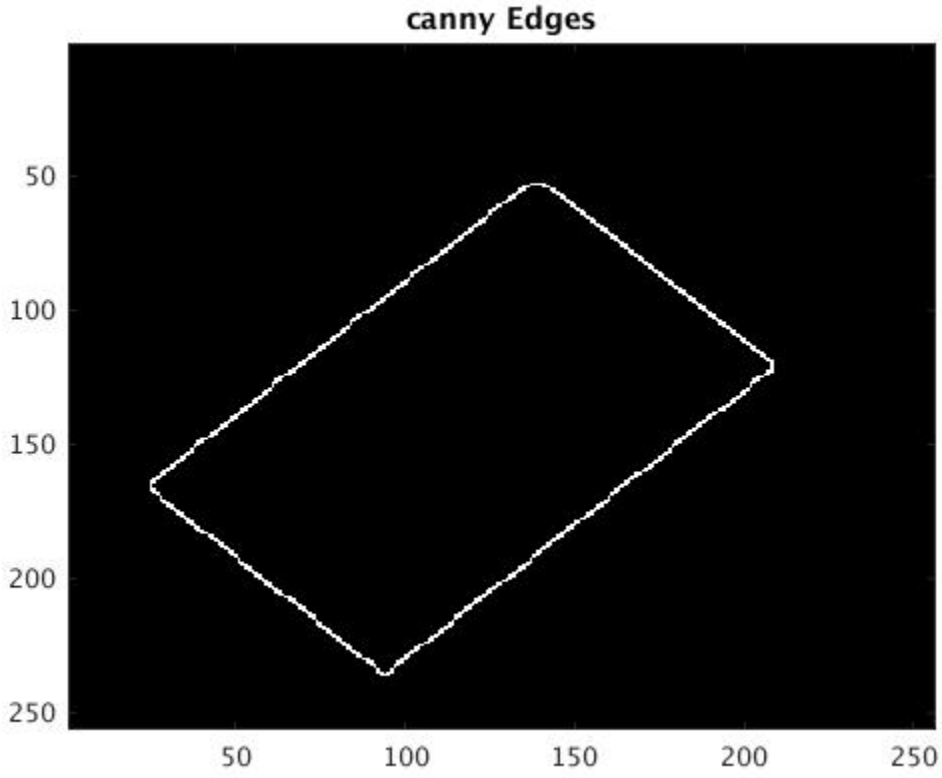
```
OB1 = imread('object1.bmp');
R2 = imread('object2.bmp');
C3 = imread('object3.bmp');
```

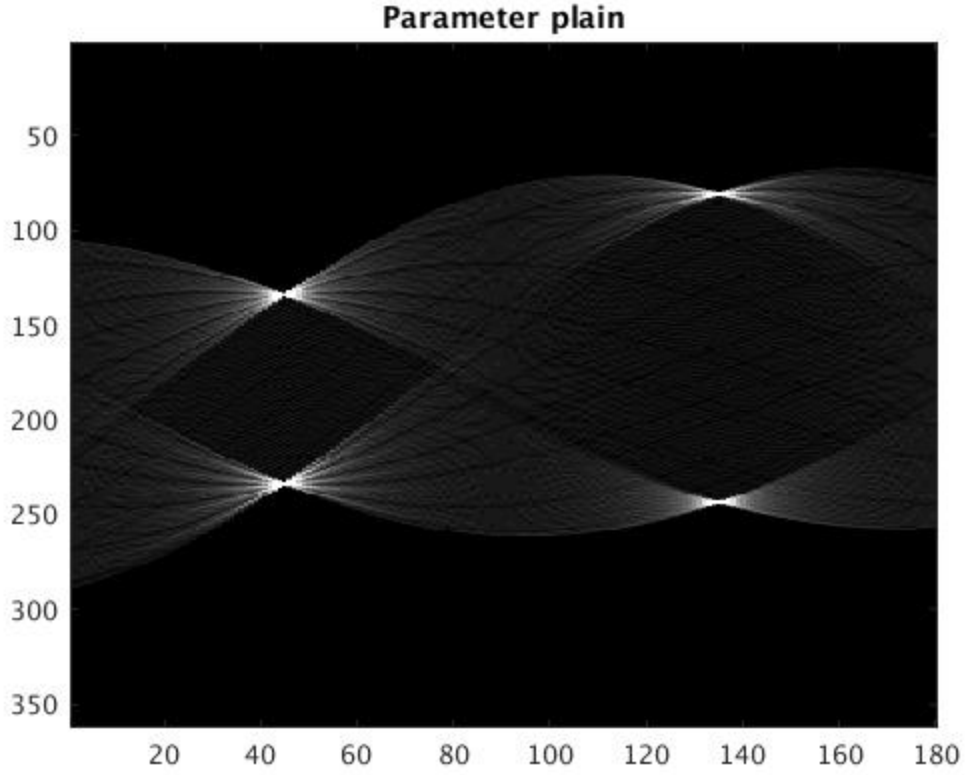
Image: object1.bmp

```
q3b2g(OB1);
```

```
Found line: r = -47, theta = 45
Found line: r = 52, theta = 45
Found line: r = -100, theta = 135
Found line: r = 62, theta = 135
There are Vertical lines!!
There are 2 parrellel lines with angle: 45
There are 2 parrellel lines with angle: 135
```


Original
50
100
150
200
250
50
100
150
200
250


canny Edges
50
100
150
200
250
50
100
150
200
250


Parameter plain
50
100
150
200
250
300
350
20
40
60
80
100
120
140
160
180

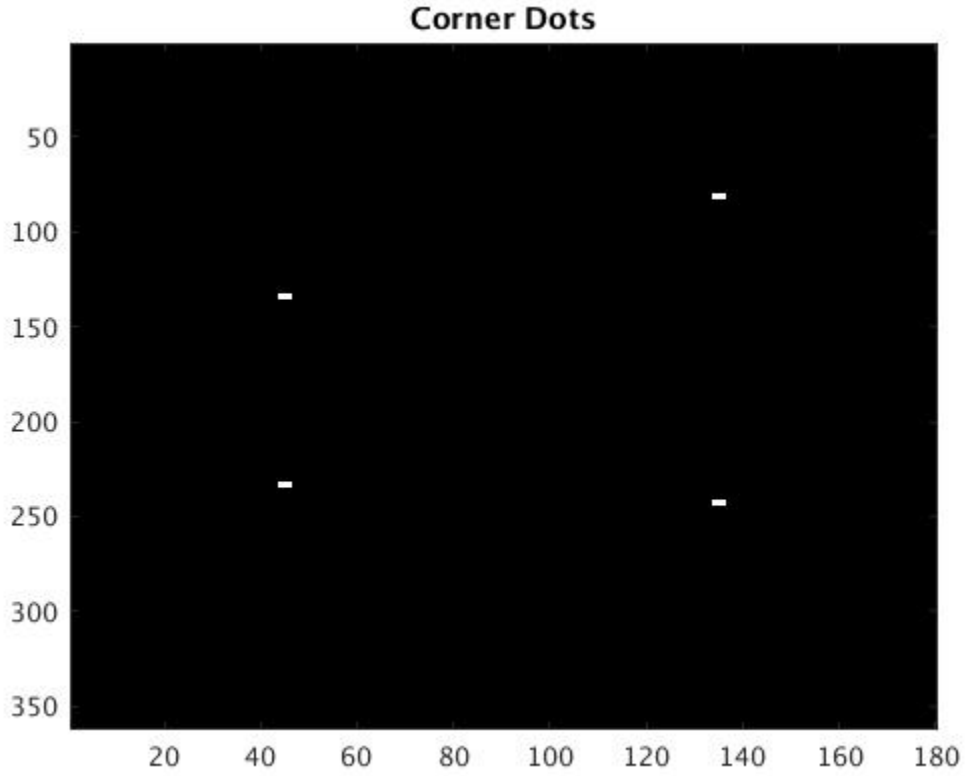
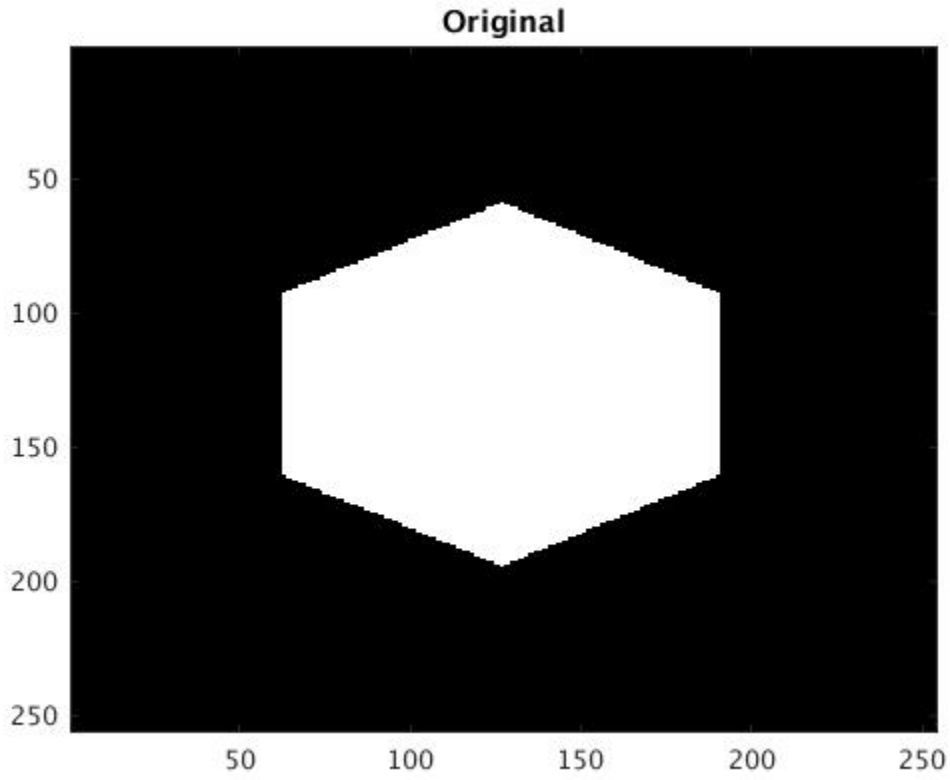
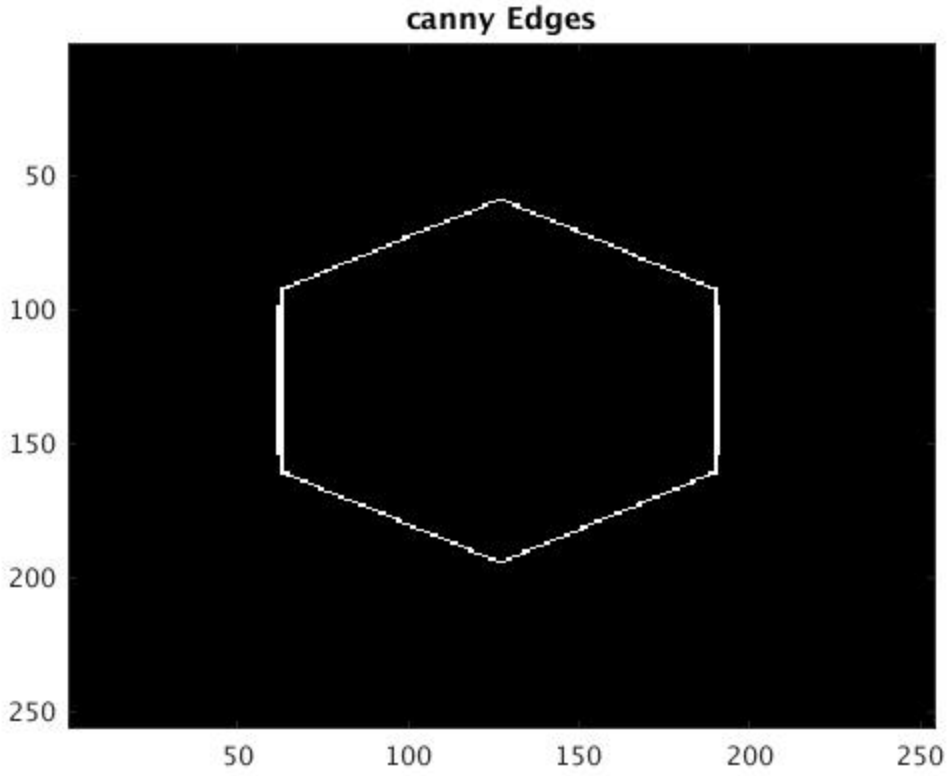

Corner Dots
50
100
150
200
250
300
350
20
40
60
80
100
120
140
160
180

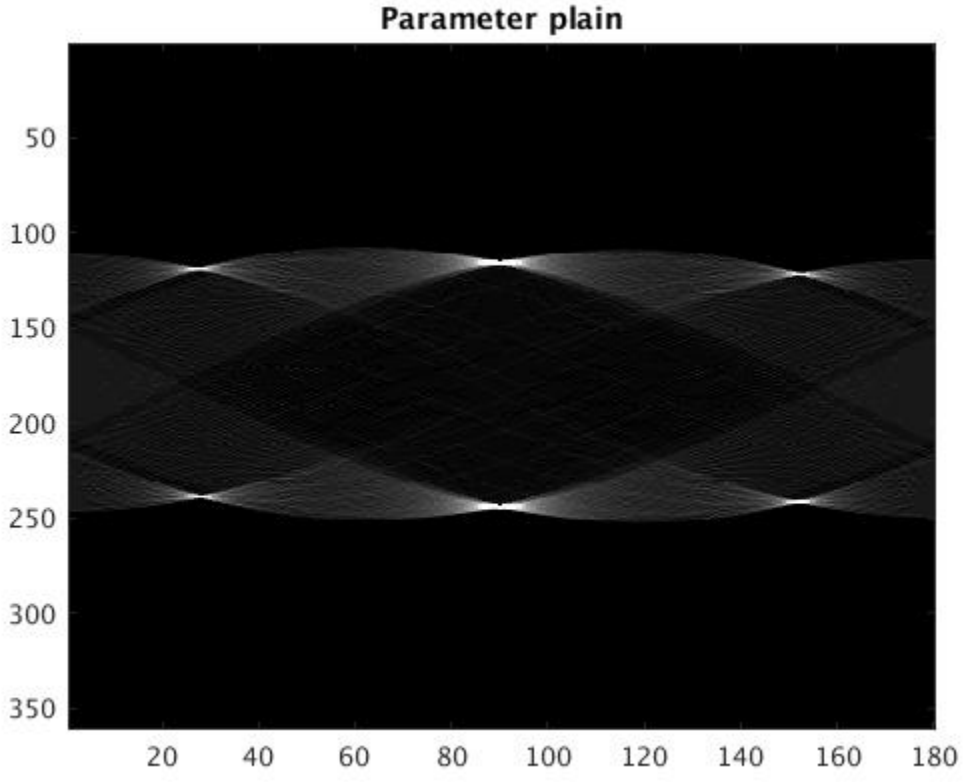
Image: object2.bmp

```
q3b2g(R2);

Found line: r = -63.5, theta = 90
Found line: r = 63.5, theta = 90
Found line: r = 58.5, theta = 28
Found line: r = -58.5, theta = 152
Found line: r = -61.5, theta = 28
Found line: r = 61.5, theta = 151
There are 2 parrellel lines with angle: 28
There are 2 parrellel lines with angle: 90
There are 2 parrellel lines with angle: 151
```




canny Edges
50
100
150
200
250
50
100
150
200
250


Parameter plain
50
100
150
200
250
300
350
20
40
60
80
100
120
140
160
180

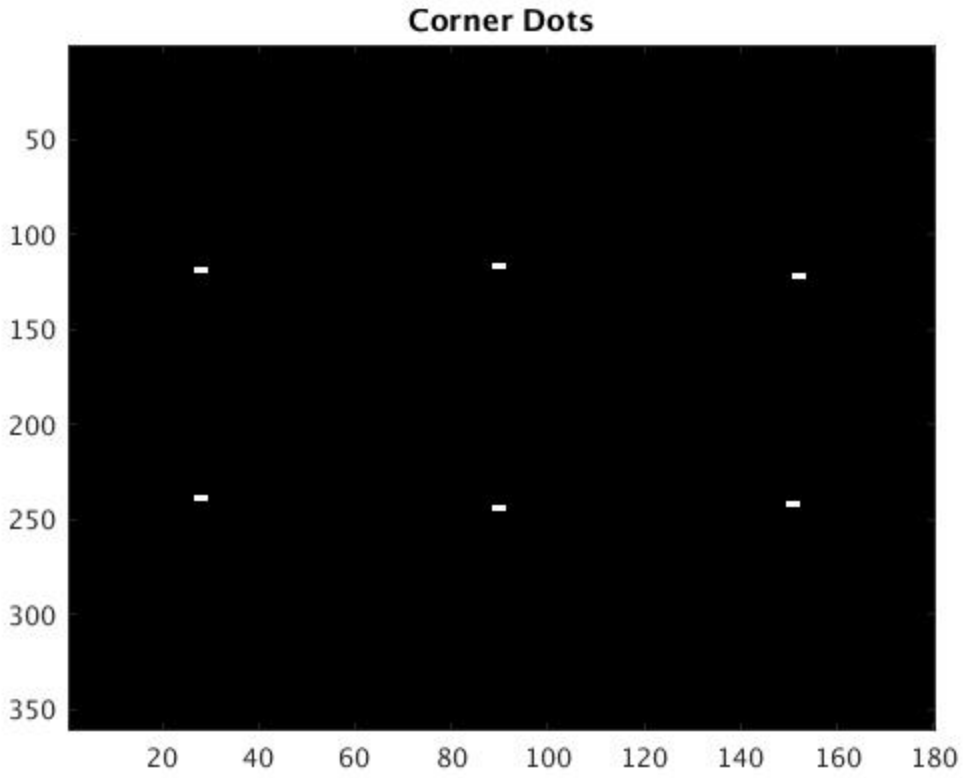
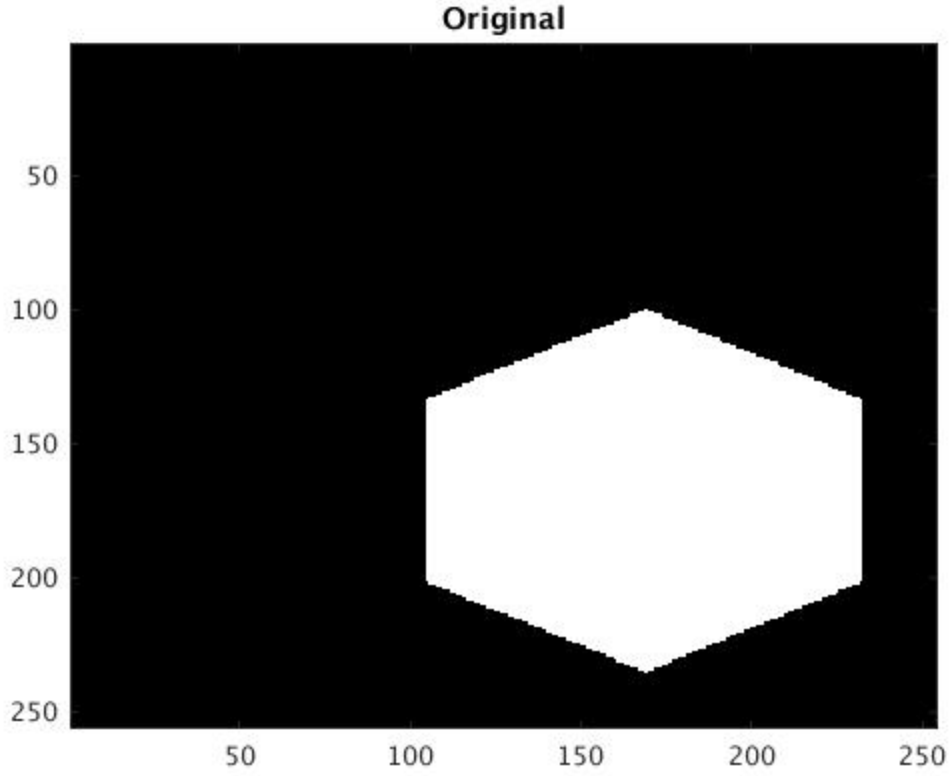
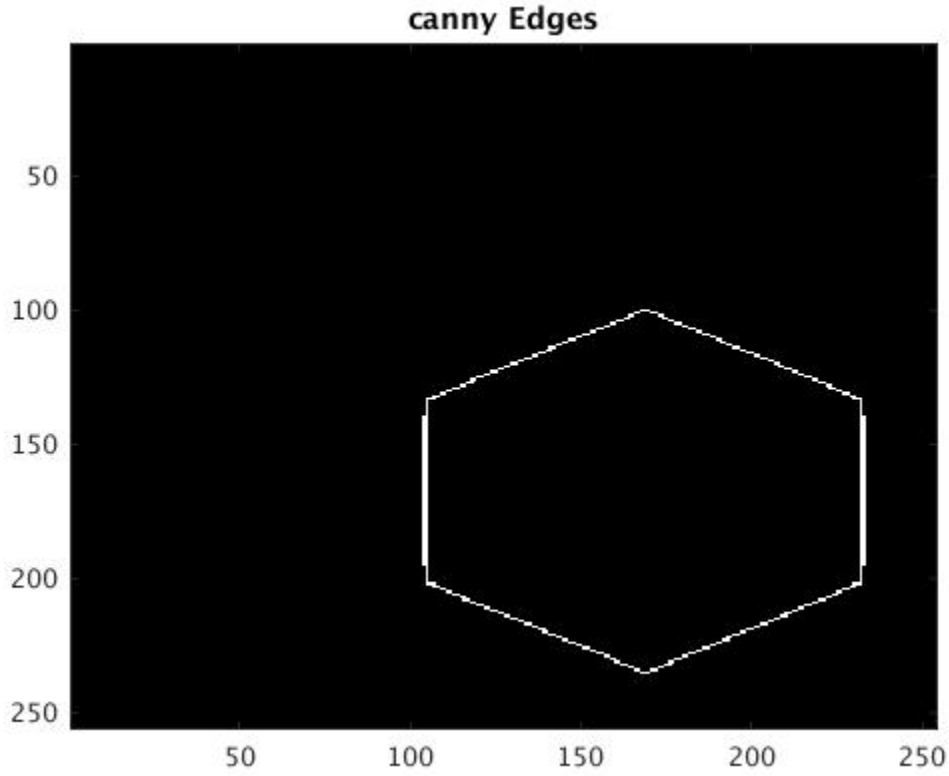


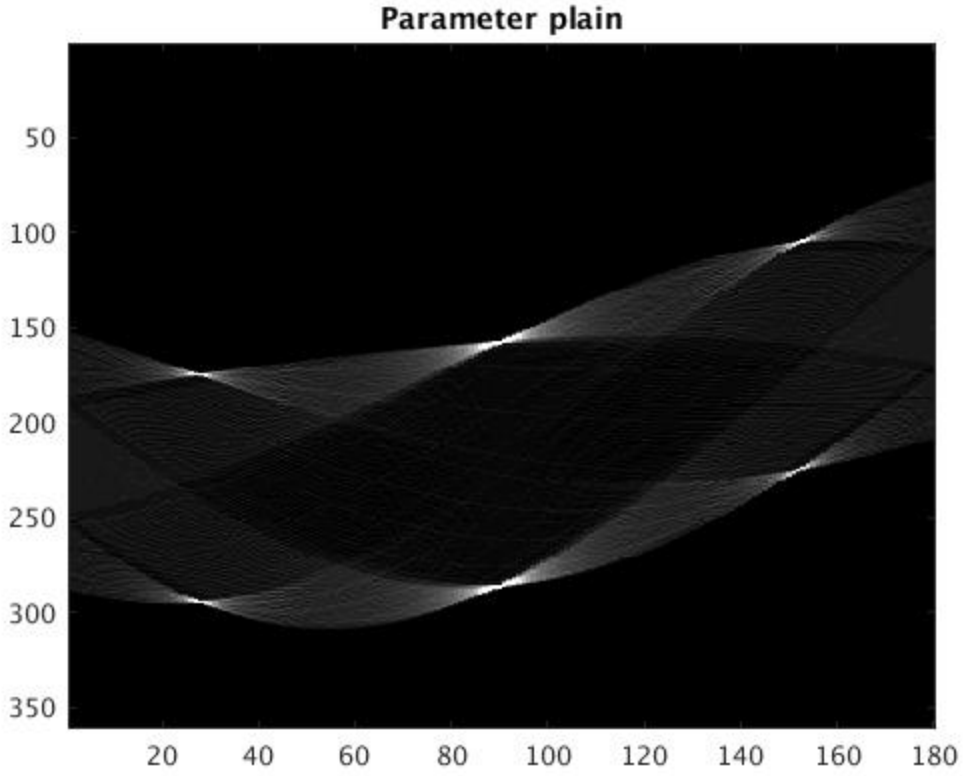
Image: object3.bmp

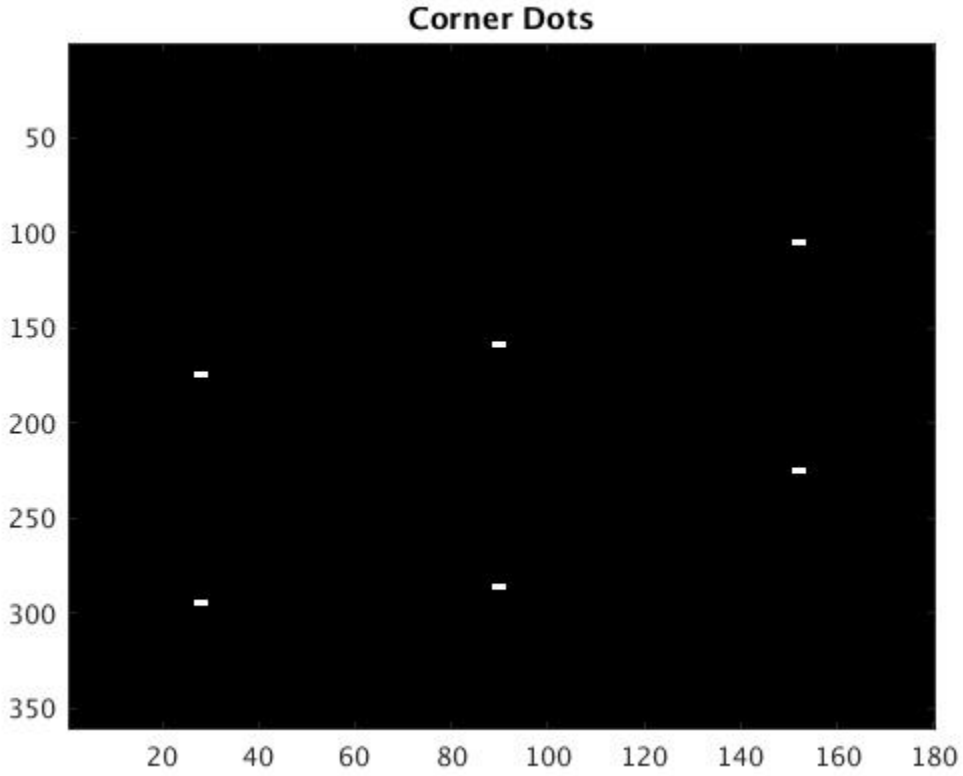
```
q3b2g(C3);

Found line: r = -21.5, theta = 90
Found line: r = 105.5, theta = 90
Found line: r = 114.5, theta = 28
Found line: r = -5.5, theta = 28
Found line: r = 44.5, theta = 152
Found line: r = -75.5, theta = 152
There are 2 parrellel lines with angle: 28
There are 2 parrellel lines with angle: 90
There are 2 parrellel lines with angle: 152
```


Original
50
100
150
200
250
50
100
150
200
250


canny Edges
50
100
150
200
250
50
100
150
200
250


Parameter plain
50
100
150
200
250
300
350
20
40
60
80
100
120
140
160
180


Corner Dots
50
100
150
200
250
300
350
20
40
60
80
100
120
140
160
180

Used function q3b2g:

```
function q3b2g(im)

figure(), image(im), colormap(gray(2)), title('Original');

% B
imEdges = edge(im, 'canny');
figure(), image(imEdges), colormap(gray(2)), title('canny Edges');

% C
edgesPoint = findEdgePoints(imEdges);

% D
diameter = @(im) round(norm(size(im)));

d = diameter(imEdges);
parameterPlain = zeros(d, 180);

% E
Rho = @(x,y, theta) round(x*cos(theta) + y * sin(theta) + d/2);

for J = 1:length(edgesPoint)
    for i=1:180
        theta = deg2rad(i);
        x = edgesPoint(J,1);
        y = edgesPoint(J,2);
        r = Rho(x, y, theta);
        parameterPlain(r, i) = parameterPlain(r, i) + 1;
    end
end
figure(), image(parameterPlain), colormap(gray(32)), title('Parameter plai

% F
thresh = 20;

parameterPlain(parameterPlain<thresh) = 0;
temp = parameterPlain;
parameterPlain2Plot = zeros(size(parameterPlain));
bolding = -1:1;

while 1
    [val, ind] = max(temp(:));
    if val == 0
        break
    end
    [indI, indJ] = ind2sub(size(temp), ind);
    area = -10:10;
    temp(area + indI, area + indJ) = 0;
    parameterPlain(area + indI, area + indJ) = 0;
    parameterPlain(ind) = 1;
    parameterPlain2Plot(bolding + indI, bolding + indJ) = 128;
    fprintf("Found line: r = %g, theta = %g\n",indI,indJ);
end
figure(), image(parameterPlain2Plot), colormap(gray(128)), title('Corner D
```

```
line_angles = sum(parameterPlain);
oneLines = find(line_angles == 1) -1;
oneLines(oneLines<1) = [];
line_angles(oneLines) = line_angles(oneLines) + 1 ;

single_line_angles = line_angles;
single_line_angles(single_line_angles>1) = 1;
vertical_lines = single_line_angles(1:90) + single_line_angles(91:180);
vertical_lines(vertical_lines < 2) = 0;
if find(vertical_lines > 1)
    fprintf("There are Vertical lines!!\n");
end
parllel_lines_angles = find(line_angles>1);
if find(parllel_lines_angles > 1)
    for angle=parllel_lines_angles
        fprintf("There are %g parrellel lines with angle: %g\n", line_angl
    end
end

end
```

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