```matlab
clc
clear all
close all

Im_name = 'custom.png';
Im = imread(Im_name);
Im_size(:)=size(Im);%Gather size data of image
X=Im_size(1);%Save the x dimension
Y=Im_size(2);%Save the Y dimension

while Y > 300
    Im = imresize(Im,.5);
    Im_size(:)=size(Im);%Gather size data of image
    X=Im_size(1)%Save the x dimension
    Y=Im_size(2)%Save the Y dimension
end
```
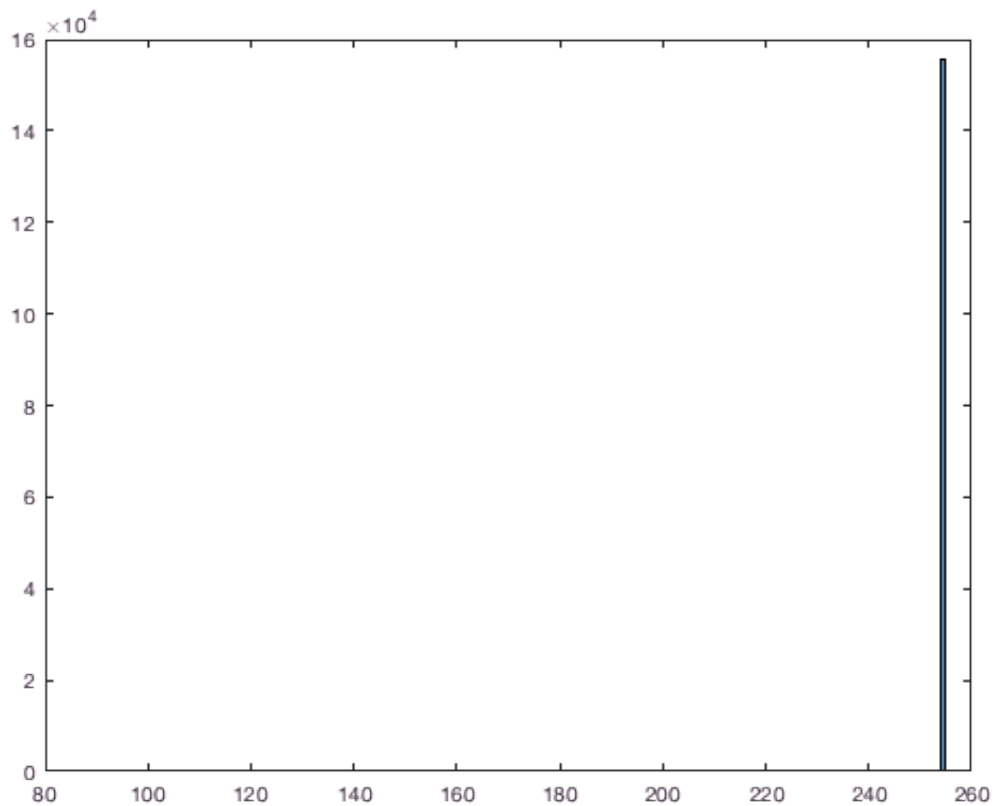
```
X = 450
Y = 481
X = 225
Y = 241
```

```matlab
histogram(Im)
```



```matlab
%Add or remove thresholds in the line below according to the histogram
%Globe threshs: 0,117,200
thresh = [117,200]
```
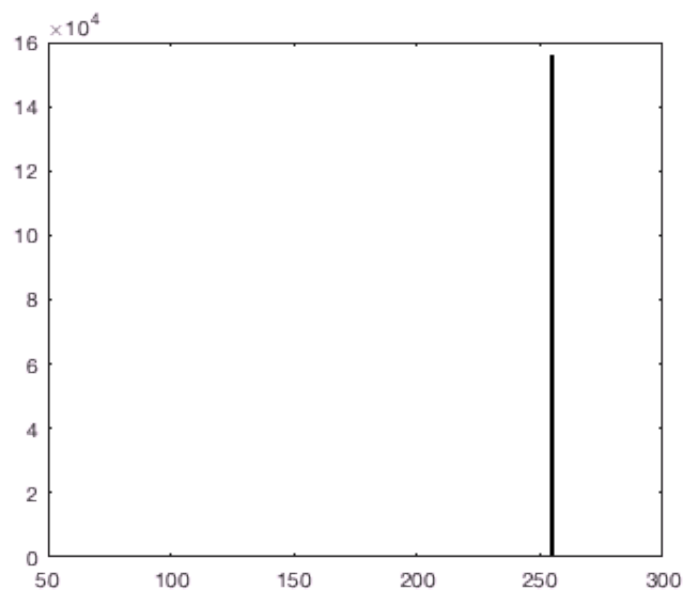
```
thresh =

   117   200
```

```matlab
%Convert the image based on the thresholds
Im_Shaded = imquantize(Im,thresh);

%fileID = fopen('Untitled.txt','wt');
%fprintf(fileID,'%f',Im_Shaded);
%fclose(fileID);

imshow(Im);
```
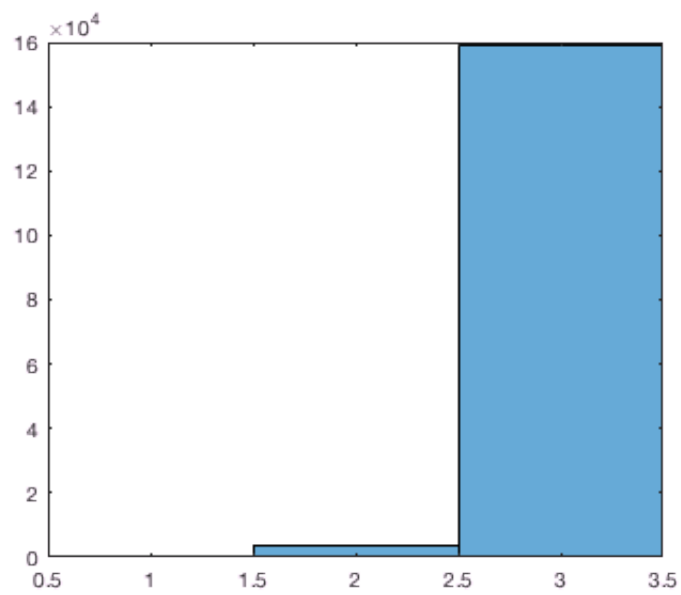


```matlab
histogram(Im)
```
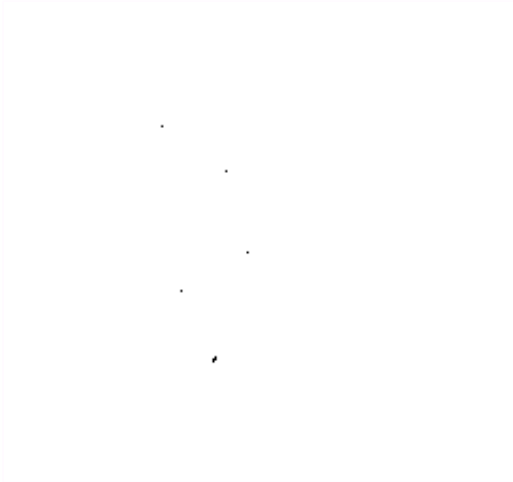


```matlab
histogram(Im_Shaded)
```
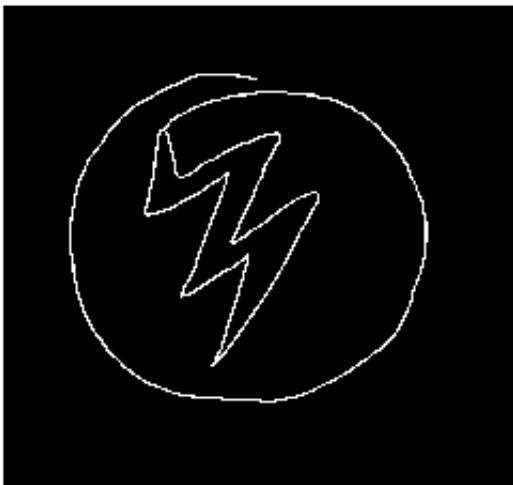
```
imshow(Im_Shaded,[])
```

```
%Now isolating each shade as a seperate b and w image
max_value=max(Im_Shaded(:))
```
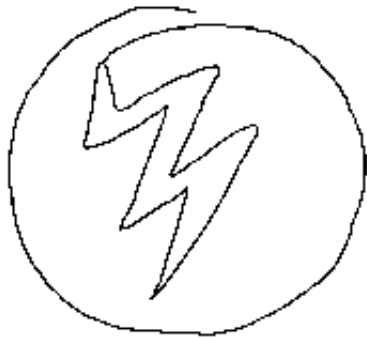
```
max_value = 3
```

```
Im_array_1=im2bw(Im,thresh(1)/255);
Im_array_2=~im2bw(Im,thresh(2)/255);
Im_array_3=im2bw(Im,thresh(2)/255);

imshow(Im_array_1);
```

```
imshow(Im_array_2);
```



```
imshow(Im_array_3);
```

```
%---------------------------------------------
num_objects_1 = max(max(bwlabel(Im_array_1)))
```

```
 num_objects_1 = 1
```

```
num_objects_2 = max(max(bwlabel(Im_array_2)))
```

```
 num_objects_2 = 1
```

```
num_objects_3 = max(max(bwlabel(Im_array_3)))
```
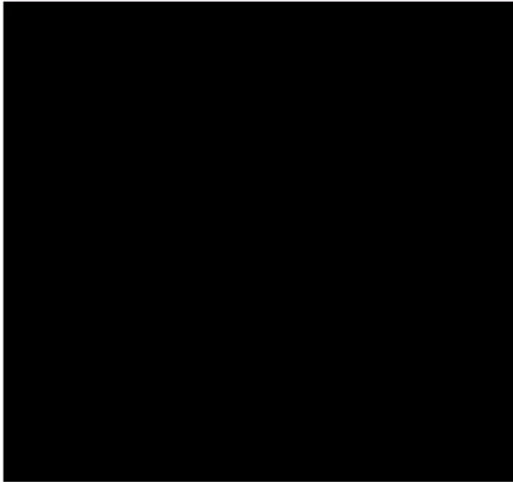
```
 num_objects_3 = 1
```

```
%Converts the different shades into outlines
Im_array_outline_3 = bwmorph(Im_array_3,'remove');
Im_array_outline_2 = (bwmorph(bwmorph(Im_array_2,'remove'),'clean'));
Im_array_outline_1 = bwmorph(Im_array_1,'remove')-bwmorph(Im_array_3,'remove')-bwmorph(Im_arra
```
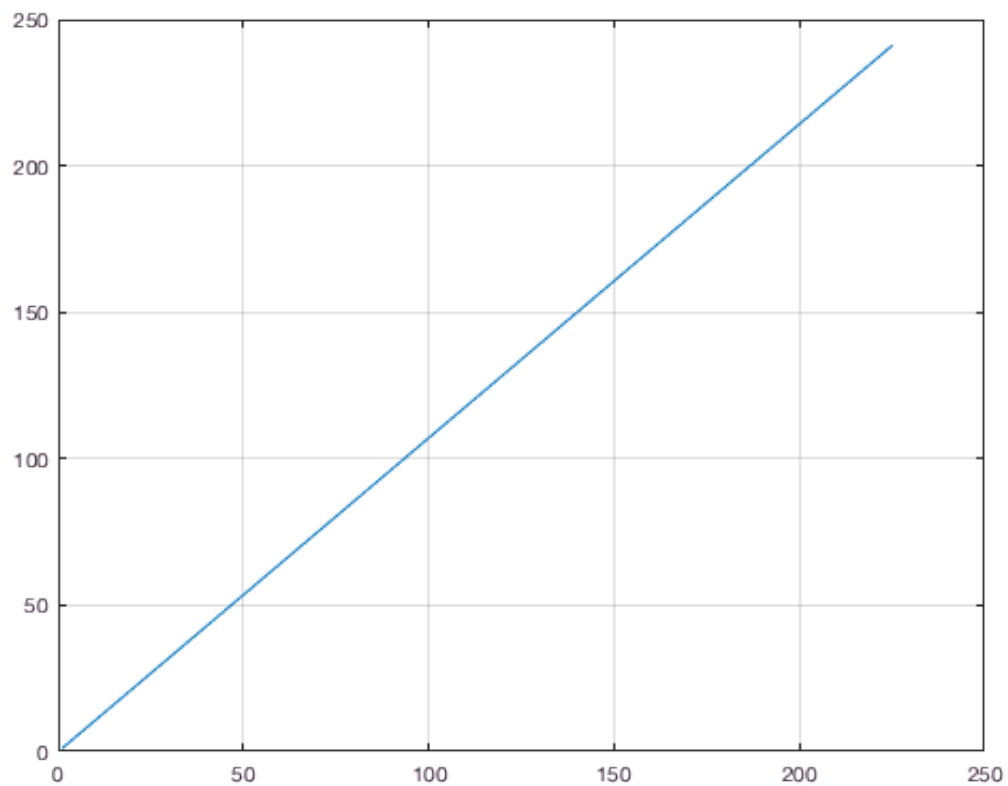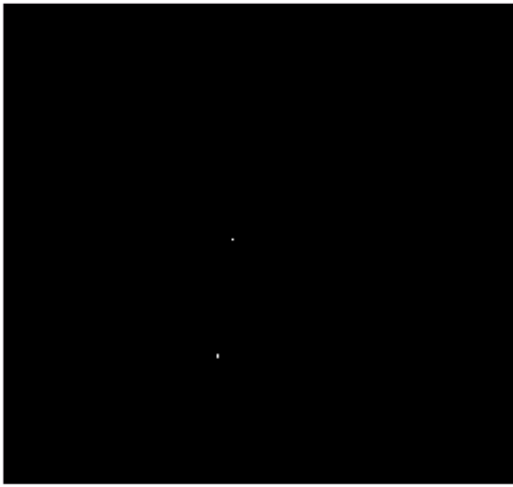
```
imshow(Im_array_outline_1)
```

```matlab
Im_array_rot_1 = imrotate(Im_array_outline_1,270);
[x_moves, y_moves, x_coor, y_coor, X_1, Y_1] = image_2_machine(Im_array_rot_1,X,Y);

figure
plot(x_coor,y_coor)
grid on
```

```
Im_please_work = Im_array_1 - Im_array_3 - Im_array_outline_2;

imshow(Im_please_work)
```
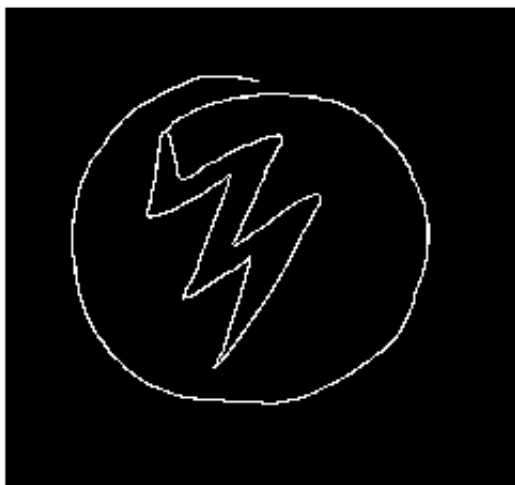


```
Im_array_rot_1 = imrotate(Im_please_work,270);
[x_moves_2, y_moves_2, x_coor_2, y_coor_2, X_2, Y_2] = image_2_machine(Im_array_rot_1,X_1,Y_1)

figure
plot(x_coor_2,y_coor_2)
grid on
```
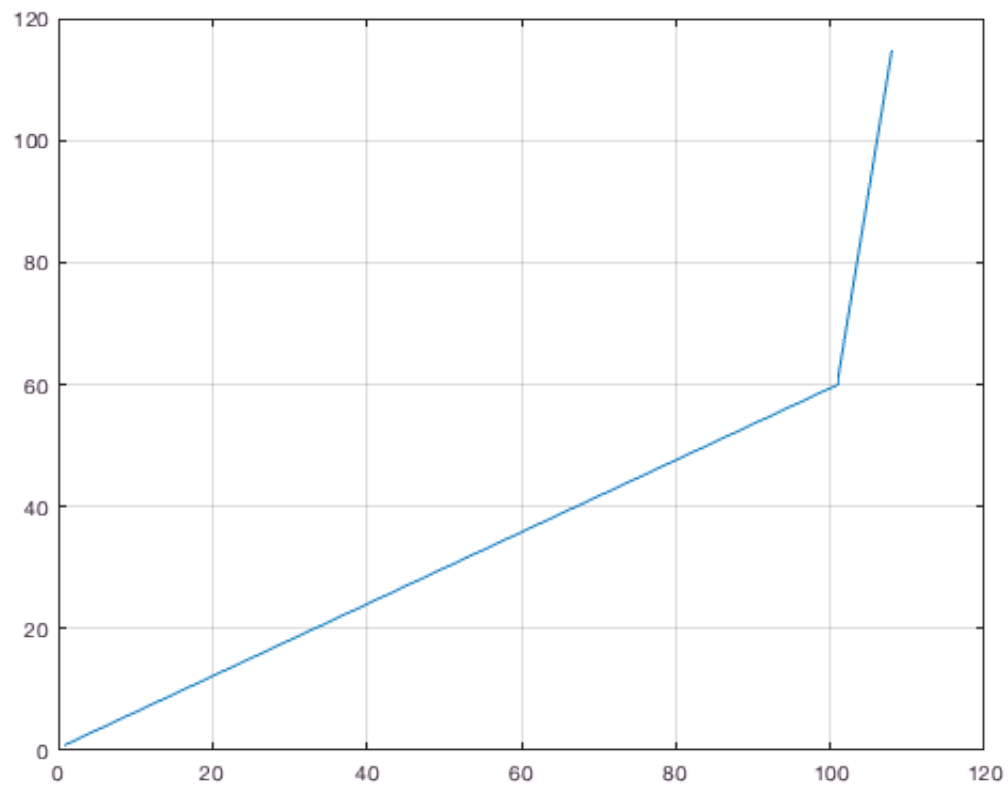
```
imshow(Im_array_outline_2)
```



```
Im_array_rot_2 = imrotate(Im_array_outline_2,270);
if (Im_name ~= 'custom.png')
```
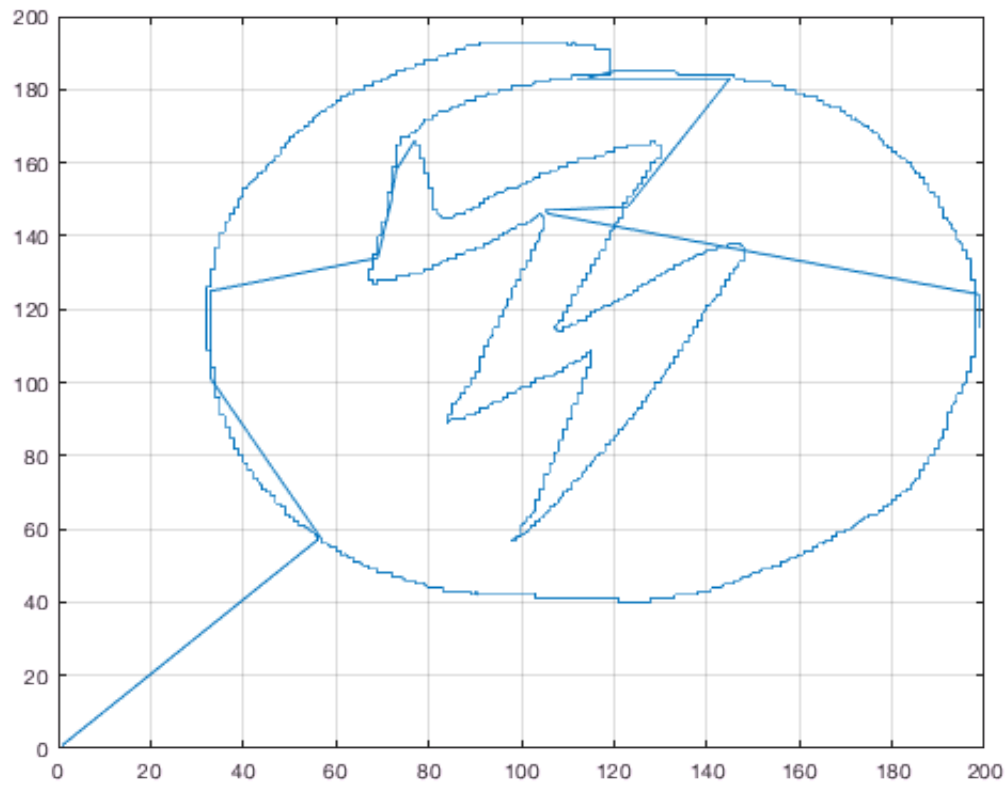
```matlab
    [x_moves_3, y_moves_3, x_coor_3, y_coor_3, X_3, Y_3] = image_2_machine(Im_array_rot_2,X_2,Y_2)
else
    [x_moves_3, y_moves_3, x_coor_3, y_coor_3, X_3, Y_3] = image_2_machine(Im_array_rot_2,1,1);
end

figure
plot(x_coor_3,y_coor_3)
grid on
```
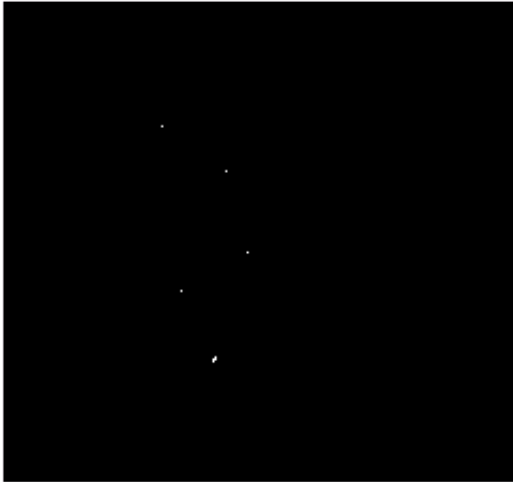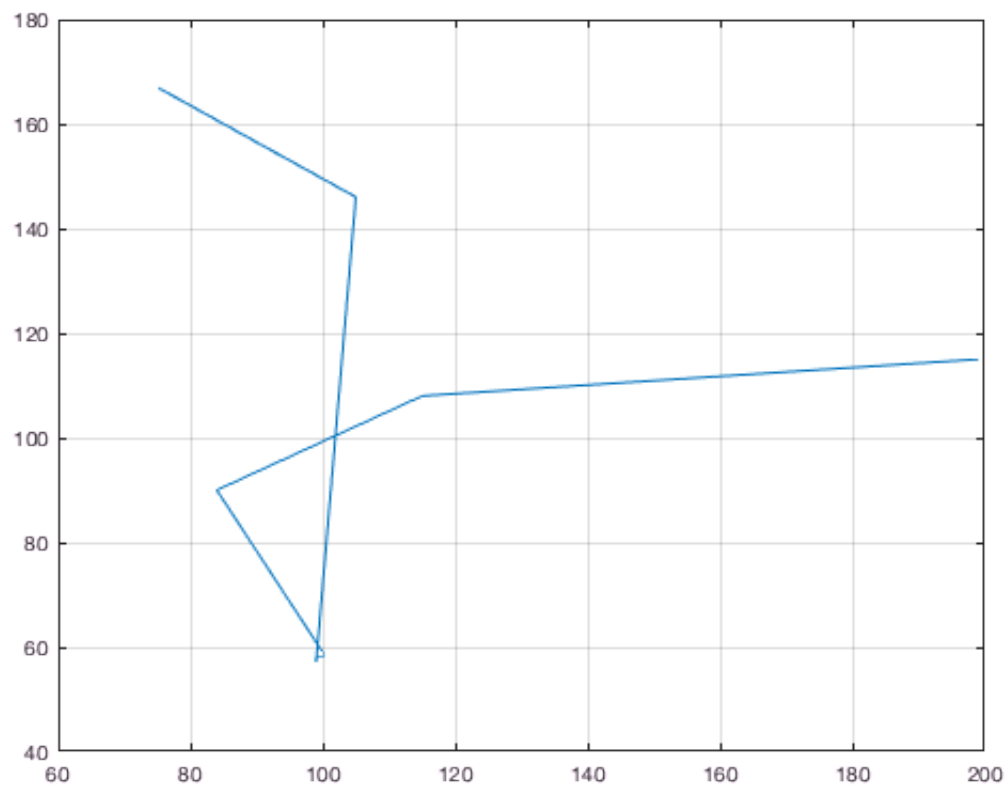


```matlab
Im_please_work_2 = Im_array_2-Im_array_1;

imshow(Im_please_work_2)
```

```
Im_array_rot_2 = imrotate(Im_please_work_2,270);
[x_moves_4, y_moves_4, x_coor_4, y_coor_4, X_4, Y_4] = image_2_machine(Im_array_rot_2,X_3,Y_3)

figure
plot(x_coor_4,y_coor_4)
grid on
```

```matlab
dec2bin(abs(y_moves_3(1)),8);
```

```matlab
%[x_move_3, y_move_3, final_x_3, final_y_3, num_steps_3 ] = conv_to_moves( Im_array_outline_1,

if (Im_name ~= 'custom.png')
num_steps = length(x_moves_4)+length(x_moves_3)+length(x_moves_2)+length(x_moves)

fileID = fopen('image_data.h','w');
fprintf(fileID,'long num_of_steps = ');
fprintf(fileID,'%li;\n\n',num_steps);
fprintf(fileID,'//Coordinates: \n//');
for i = 1:length(x_coor_3)
    if x_coor_3(i) < 0
    fprintf(fileID,'%li',0-x_coor_3(i));
    else
    fprintf(fileID,'%li',x_coor_3(i));
    end
        fprintf(fileID,',');
    if y_coor_3(i) < 0
    fprintf(fileID,'%li',0-y_coor_3(i));
    else
    fprintf(fileID,'%li',y_coor_3(i));
    end
    if (num_steps ~= i)

        fprintf(fileID,',');
    end
end

fprintf(fileID,'\n//Move list from origin (0,0) with every 4 numbers being a step: \n//');
for i = 1:length(x_moves_3)
    if x_moves_3(i) < 0
    fprintf(fileID,' %li, 0',0-x_moves_3(i));
    else
    fprintf(fileID,' 0, %li',x_moves_3(i));
    end
        fprintf(fileID,',');
    if y_moves_3(i) < 0
    fprintf(fileID,' %li, 0',0-y_moves_3(i));
    else
    fprintf(fileID,' 0, %li',y_moves_3(i));
    end
    if (num_steps ~= i)

        fprintf(fileID,';');
    end
end
fprintf(fileID,'\n//Binary move list with 3 moves per byte\n//Format: 0x00,Move1,Move2,Move3\n
fprintf(fileID,'byte move_list[] = {');

write_2_file(x_moves_3,y_moves_3,fileID,1)
fprintf(fileID,'\n');
write_2_file(x_moves,y_moves,fileID,0)
fprintf(fileID,'\n');
write_2_file(x_moves_2,y_moves_2,fileID,0)
fprintf(fileID,'\n');
write_2_file(x_moves_4,y_moves_4,fileID,0)
fprintf(fileID,'};');
```

```matlab
    fclose(fileID);

type image_data.h

else
    num_steps = length(x_moves_3)

    fileID = fopen('image_data.h','w');
    fprintf(fileID,'long num_of_steps = ');
    fprintf(fileID,'%li;\n\n',num_steps);

fprintf(fileID,'char move_list[');
fprintf(fileID,'] = {');

for i = 1:num_steps
    if x_moves_3(i) < 0
    fprintf(fileID,' %li, 0',0-x_moves_3(i));
    else
    fprintf(fileID,' 0, %li',x_moves_3(i));
    end
        fprintf(fileID,',');
    if y_moves_3(i) < 0
    fprintf(fileID,' %li, 0',0-y_moves_3(i));
    else
    fprintf(fileID,' 0, %li',y_moves_3(i));
    end
    if (num_steps ~= i)

        fprintf(fileID,',');
    end
end

fprintf(fileID,'};\n//Fin');
    fprintf(fileID,'\n');
    fclose(fileID);

type image_data.h
end
```

```
 num_steps = 1290
 long num_of_steps = 1290;
```