PART II: Camera Calibration using 2D calibration object

(a). Corner Extraction and Homography computation
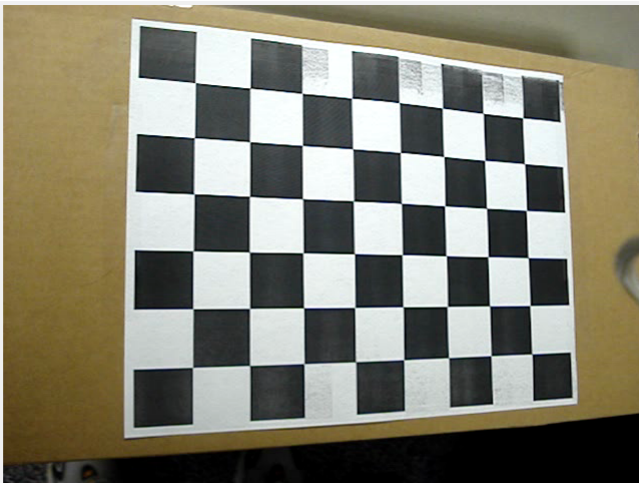
```
width = 9;
height = 7;
squareSize = 30;

world_coordinates = [0,0,1; 0,(height*squareSize),1; (width*squareSize),(height*square

world_coordinates=world_coordinates';
disp(world_coordinates);
```

```
     0     0   270   270
     0   210   210     0
     1     1     1     1
```

```
img1 = imread("images2.png");
img2 = imread("images9.png");
img3 = imread("images12.png");
img4 = imread("images20.png");

imshow(img1), [x1,y1] = ginput(4);
```



```
imshow(img2), [x2,y2] = ginput(4);
```

```
imshow(img3), [x3,y3] = ginput(4);
```



```
imshow(img4), [x4,y4] = ginput(4);
```

```
disp([x1,y1]);
```

```
  60.0000  418.0000
  86.0000   68.0000
 528.0000   74.0000
 544.0000  422.0000
```

```
disp([x2,y2]);
```

```
 122.0000  424.0000
 128.0000   16.0000
 558.0000   72.0000
 574.0000  390.0000
```

```
disp([x3,y3]);
```

```
  98.0000  396.0000
 110.0000   88.0000
 516.0000   18.0000
 536.0000  414.0000
```

```
disp([x4,y4]);
```

```
 120.0000  278.0000
 176.0000   84.0000
 522.0000   76.0000
 590.0000  276.0000
```

```
ones = [1,1,1,1];

image_coordinates_1 = [x1(:), y1(:), ones(:)]';
image_coordinates_2 = [x2(:), y2(:), ones(:)]';
image_coordinates_3 = [x3(:), y3(:), ones(:)]';
image_coordinates_4 = [x4(:), y4(:), ones(:)]';

H1 = homography2d(world_coordinates, image_coordinates_1);
```

```
H2 = homography2d(world_coordinates, image_coordinates_2);
H3 = homography2d(world_coordinates, image_coordinates_3);
H4 = homography2d(world_coordinates, image_coordinates_4);

disp("Homography of --> images2.png")
```

Homography of --> images2.png

```
disp(H1)
```

```
    0.9953    0.0897   33.0388
    0.0145   -0.9008  230.1702
    0.0000    0.0002    0.5506
```

```
disp("Homography of --> images9.png")
```

Homography of --> images9.png

```
disp(H2)
```

```
   -1.1231   -0.0324  -59.5977
   -0.1459    0.9468 -207.1266
   -0.0005   -0.0001   -0.4885
```

```
disp("Homography of --> images12.png")
```

Homography of --> images12.png

```
disp(H3)
```

```
    0.7260    0.0580   61.4728
   -0.1834   -0.9023  248.4005
   -0.0005    0.0002    0.6273
```

```
disp("Homography of --> images20.png")
```

Homography of --> images20.png

```
disp(H4)
```

```
   -0.8560   -0.2914  -62.4569
    0.0273    0.4080 -144.6918
    0.0001   -0.0009   -0.5205
```