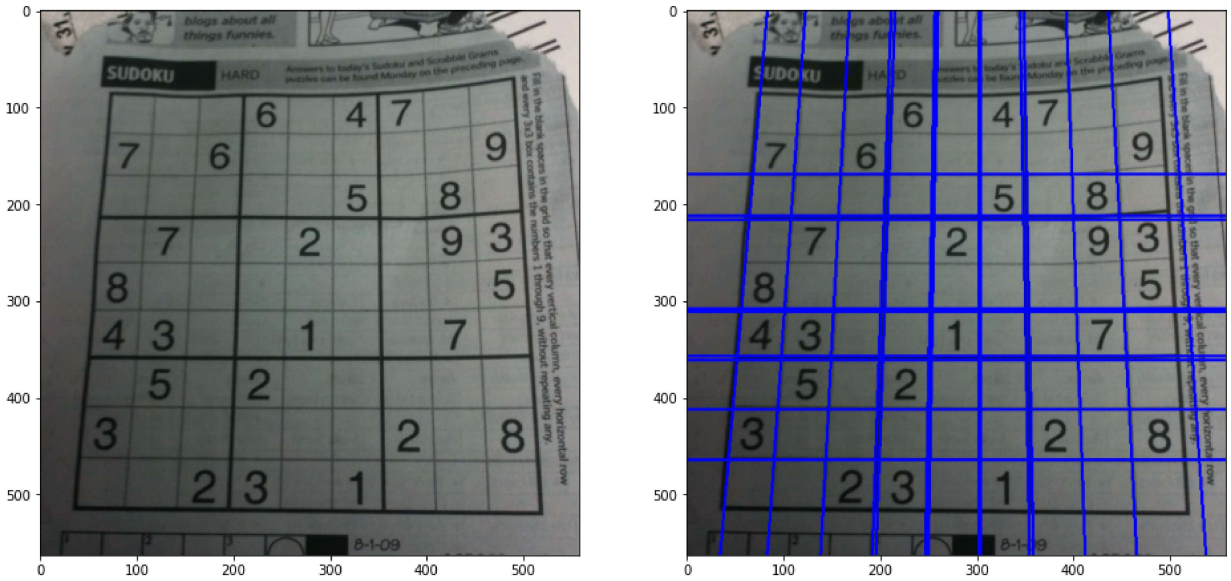
Index: 190098M Ex06

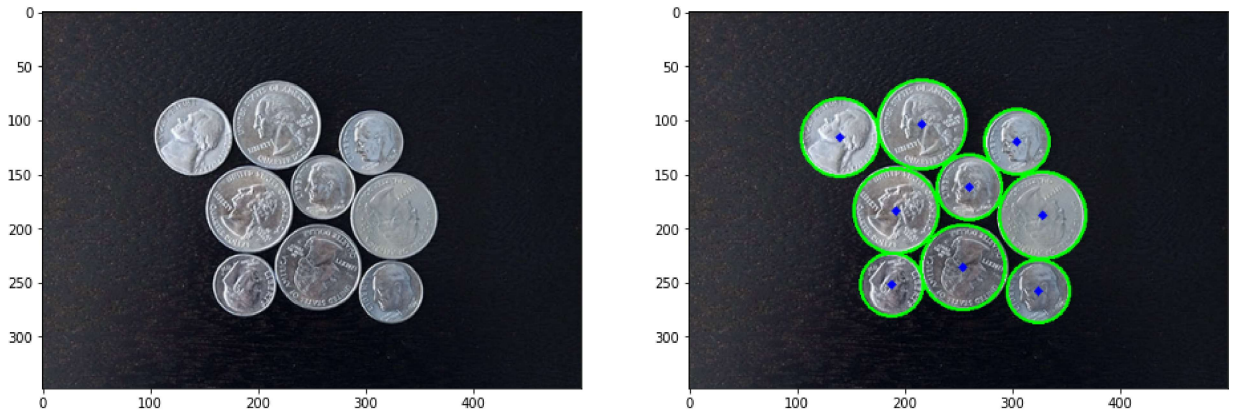
In [ ]:
```
#Q01
import cv2 as cv
import matplotlib.pyplot as plt
import numpy as np
fig,ax = plt.subplots(1,2,figsize =(16,8))
im = cv.imread("sudoku.png",cv.IMREAD_COLOR)
ax[0].imshow(im)
assert im is not None
gray = cv.cvtColor(im,cv.COLOR_BGR2GRAY)
edged = cv.Canny(gray,20,120,apertureSize = 3)
lines = cv.HoughLines(edged,1,np.pi/180,230)
for line in lines:
    rho,theta =line[0]
    a = np.cos(theta)
    b = np.sin(theta)
    x0 ,y0= a*rho,b*rho
    x1 ,y1= int(x0+1000*(-b)),int(y0+1000*(a))
    x2 ,y2= int(x0-1000*(-b)),int(y0-1000*(a))
    cv.line(im,(x1,y1),(x2,y2),(0,0,255),2)
    ax[1].imshow(im)
```



In [ ]:
```
#Q02
import cv2 as cv
import matplotlib.pyplot as plt
import numpy as np
fig,ax = plt.subplots(1,2,figsize =(16,8))
im = cv.imread("coins.jpg",cv.IMREAD_COLOR,).astype(np.uint16)
ax[0].imshow(im)
assert im is not None
gray = cv.cvtColor(im,cv.COLOR_BGR2GRAY).astype(np.uint8)

circles = cv.HoughCircles(gray,cv.HOUGH_GRADIENT,1,50,param1=180,param2=80,minRadius=1
circles = np.uint16(np.around(circles))
for i in circles[0,:]:
    # draw the outer circle
    cv.circle(im,(i[0],i[1]),i[2],(0,255,0),2)
    # draw the center of the circle
```

```
    cv.circle(im,(i[0],i[1]),2,(0,0,255),3)
ax[1].imshow(im)
```

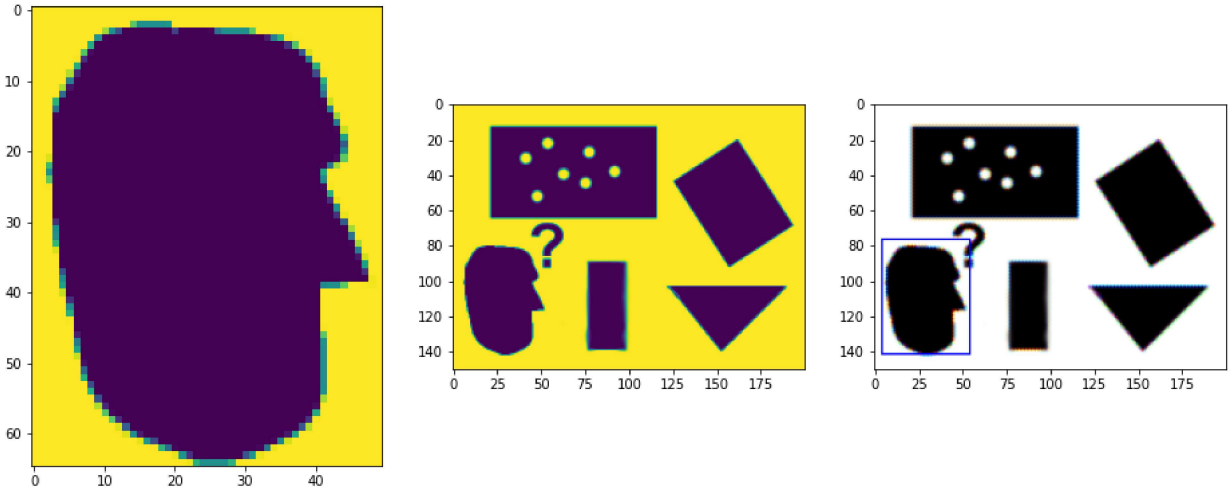
Out[ ]:
```
<matplotlib.image.AxesImage at 0x1f8c2c7ee30>
```



In [ ]:
```
#Q03
import cv2 as cv
import matplotlib.pyplot as plt
import numpy as np
fig,ax = plt.subplots(1,3,figsize =(16,8))
img=cv.imread(r'pic1.png',cv.IMREAD_REDUCED_GRAYSCALE_2)
assert img is not None
temp=cv.imread(r'templ.png',cv.IMREAD_REDUCED_GRAYSCALE_2)
assert temp is not None

im_edges = cv.Canny(img,50,250)
temp1_edges = cv.Canny(temp,50,250)
alg = cv.createGeneralizedHoughGuil()

im_edges=cv.Canny(img,50,250)
temp_edges=cv.Canny(temp,50,250)
alg=cv.createGeneralizedHoughGuil()
alg.setTemplate(temp_edges)
alg.setAngleThresh(100000)
alg.setScaleThresh(40000)
alg.setPosThresh(1000)
alg.setAngleStep(1)
alg.setScaleStep(0.1)
alg.setMinScale(0.9)

alg.setMaxScale(1.1)
positions,votes = alg.detect(im_edges)

out = cv.cvtColor(img,cv.COLOR_BAYER_BG2BGR)
for x,y,scale,orientation in positions[0]:
    halfHeight = temp.shape[0]/2.*scale
    halfWidth = temp.shape[1]/2.*scale
    p1 = (int(x-halfWidth),int(y-halfHeight))
    p2 = (int(x+halfWidth),int(y+halfHeight))
    print("x = {},y = {}, orientation = {}, p1 = {}, p2 ={}".format(x,y,scale,orientat
    cv.rectangle(out,p1,p2,(0,0,255))

ax[0].imshow(temp)
ax[1].imshow(img)
ax[2].imshow(out)
```

```
x = 29.0,y = 109.0, orientation = 1.0, p1 = 0.0, p2 =(4, 76)
<matplotlib.image.AxesImage at 0x24514b82920>
```

Out[ ]:

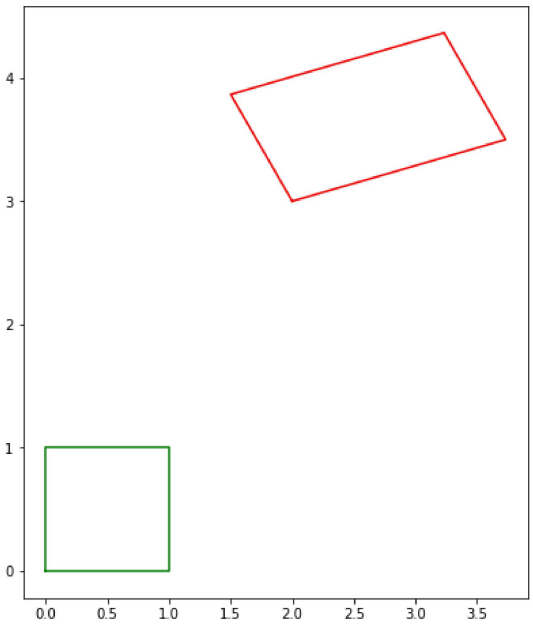


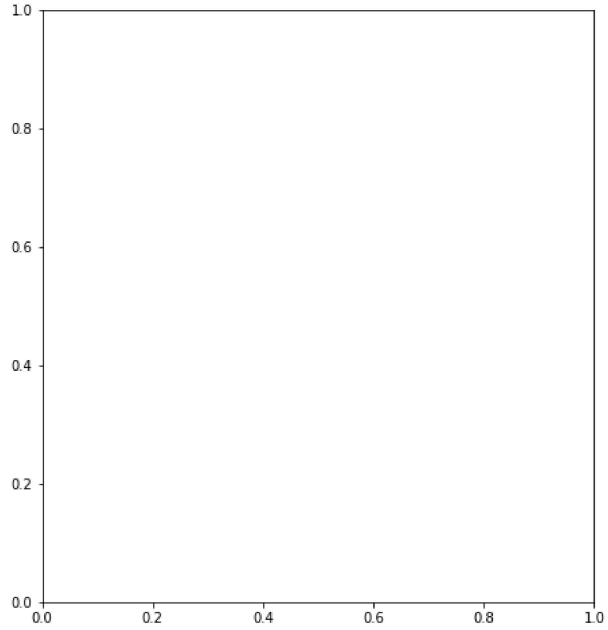
In [ ]:

None

In [ ]:

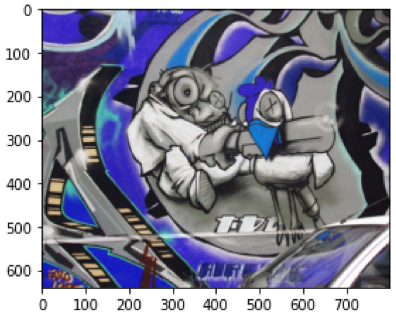
```
#Q04
import cv2 as cv
import matplotlib.pyplot as plt
import numpy as np
a,b,c,d = [0,0,1],[0,1,1],[1,1,1],[1,0,1]
X = np.array([a,b,c,d]).T
theta = np.pi*30/180
s=1
tx,ty = 2,3
H = np.array([[2*np.cos(theta),-s*np.sin(theta),tx],[s*np.sin(theta),s*np.cos(theta),t
Y = H@X
x = np.append(X[0,:],X[0,0])
y = np.append(X[1,:],X[1,0])
fig,ax = plt.subplots(1,2,figsize =(16,8))
ax[0].plot(x,y,color = 'g')
ax[0].set_aspect('equal')

x = np.append(Y[0,:],Y[0,0])
y = np.append(Y[1,:],Y[1,0])

ax[0].plot(x,y,color = 'r')
ax[0].set_aspect('equal')
plt.show()
```

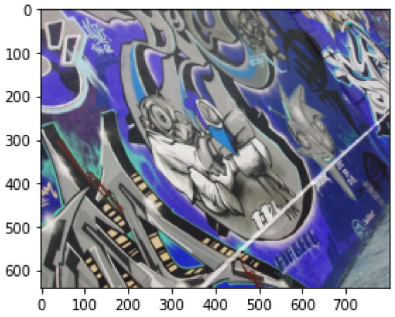


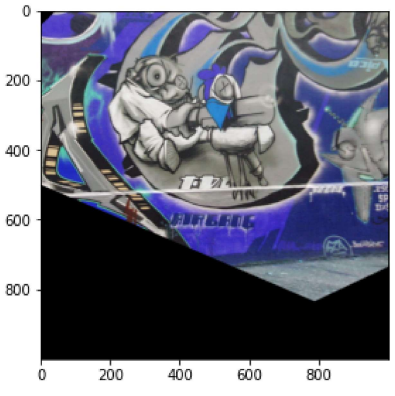


In [ ]:
```
#Q05
import cv2 as cv
import matplotlib.pyplot as plt
import numpy as np
%matplotlib inline
img1=cv.imread(r'graffity/img1.ppm',cv.IMREAD_ANYCOLOR)
assert img1 is not None
img4=cv.imread(r'graffity/img4.ppm',cv.IMREAD_ANYCOLOR)
assert img4 is not None

H=[]
with open(r'graffity/H1to4p') as f:
    H=np.array([[float(h) for h in line.split()] for line in f])
img4to1=cv.warpPerspective(img4,np.linalg.inv(H),(1000,1000))
fig,ax=plt.subplots(1,3,figsize=(15,15))
ax[0].imshow(img1)
ax[1].imshow(img4)
ax[2].imshow(img4to1)
```

Out[ ]:
```
<matplotlib.image.AxesImage at 0x245159054e0>
```







In [ ]: