Import the library

In [1]:
```python
from keras.preprocessing.image import ImageDataGenerator
```

Arguments for ImageDataGenerator class

In [2]:
```python
train_datagen=ImageDataGenerator(rescale=1./255,shear_range=0.2,zoom_range=0.2,horizontal_flip=True)
text_dataset=ImageDataGenerator(rescale=1./255)
```

Applying ImageDataGenerator functionality to trainset and testset

In [3]:
```python
from tensorflow.keras.preprocessing.image import ImageDataGenerator
train_datagen = ImageDataGenerator(rescale= 1./255,horizontal_flip = True,vertical_flip = True,zoom_range = 0.2)
test_datagen = ImageDataGenerator(rescale= 1./255)
```

In [5]:
```python
x_train = train_datagen.flow_from_directory("/content/drive/MyDrive/ibm project/TRAIN_SET",target_size = (64,64),
                                            class_mode = "categorical",batch_size = 24)
```

```
Found 4118 images belonging to 5 classes.
```

In [6]:
```python
x_test = test_datagen.flow_from_directory("/content/drive/MyDrive/ibm project/TEST_SET",target_size = (64,64),
                                                                        class_mode = "categorical",batch_size = 24)
```

```
Found 929 images belonging to 3 classes.
```

In [7]:
```python
# !pip install opencv.python
```

In [8]:
```python
import cv2
```

In [9]:
```python
#imread is used to read the image
```

In [10]:
```python
img = cv2.imread("/content/drive/MyDrive/ibm project/TEST_SET/APPLES/n07740461_1191.jpg")
```

In [11]:
```python
img
```

Out[11]:
```
array([[[174, 188, 207],
        [173, 187, 206],
        [171, 185, 204],
        ...,
        [181, 192, 206],
        [180, 192, 204],
        [179, 191, 203]],

       [[175, 189, 208],
        [174, 188, 207],
        [174, 188, 207],
        ...,
        [182, 193, 207],
        [182, 193, 207],
        [181, 193, 205]],

       [[178, 192, 211],
        [177, 191, 210],
        [177, 191, 210],
        ...,
        [184, 195, 209],
        [184, 195, 209],
        [184, 195, 209]],

       ...,

       [[161, 185, 209],
        [164, 188, 212],
        [163, 191, 215],
        ...,
        [184, 198, 216],
        [186, 200, 218],
        [187, 201, 220]],

       [[157, 185, 209],
        [158, 186, 210],
        [156, 187, 210],
        ...,
        [185, 199, 217],
        [187, 201, 219],
        [187, 201, 220]],

       [[154, 186, 209],
        [153, 185, 208],
        [150, 182, 205],
        ...,
        [187, 199, 217],
        [188, 202, 221],
        [189, 203, 222]]], dtype=uint8)
```

In [12]:
```python
img.ndim
```

Out[12]: 3

In [13]:
```python
type(img)
```

Out[13]: numpy.ndarray

In [14]:
```python
img.shape
```

Out[14]: (256, 256, 3)

In [15]:
```python
#flag 1 means color image
```

In [16]:
```python
img_flag = cv2.imread("/content/drive/MyDrive/ibm project/TEST_SET/APPLES/n07740461_1191.jpg")
```

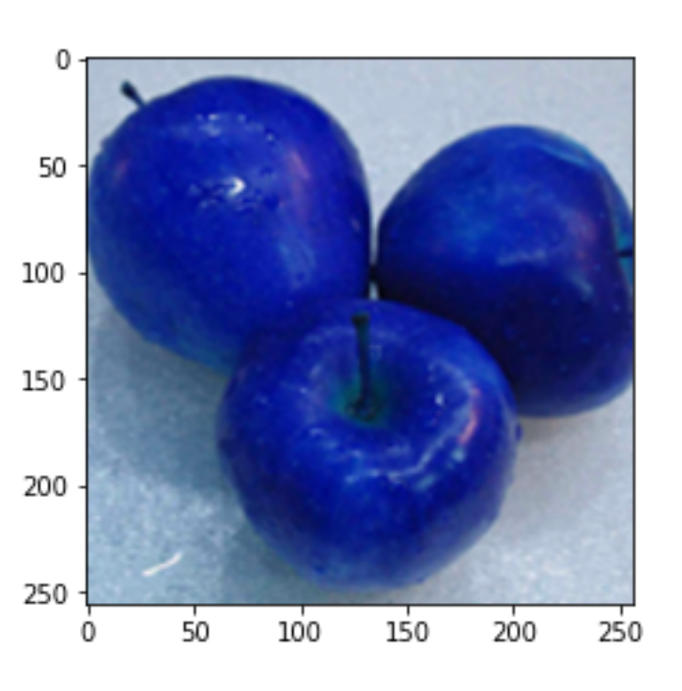
In [17]:
```python
img_flag
```

Out[17]:
```
array([[[174, 188, 207],
        [173, 187, 206],
        [171, 185, 204],
        ...,
        [181, 192, 206],
        [180, 192, 204],
        [179, 191, 203]],

       [[175, 189, 208],
        [174, 188, 207],
        [174, 188, 207],
        ...,
        [182, 193, 207],
        [182, 193, 207],
        [181, 193, 205]],

       [[178, 192, 211],
        [177, 191, 210],
        [177, 191, 210],
        ...,
        [184, 195, 209],
        [184, 195, 209],
        [184, 195, 209]],

       ...,

       [[161, 185, 209],
        [164, 188, 212],
        [163, 191, 215],
        ...,
        [184, 198, 216],
        [186, 200, 218],
        [187, 201, 220]],

       [[157, 185, 209],
        [158, 186, 210],
        [156, 187, 210],
        ...,
        [185, 199, 217],
        [187, 201, 219],
        [187, 201, 220]],

       [[154, 186, 209],
        [153, 185, 208],
        [150, 182, 205],
        ...,
        [187, 199, 217],
        [188, 202, 221],
        [189, 203, 222]]], dtype=uint8)
```

In [18]:
```python
import matplotlib.pyplot as plt
```

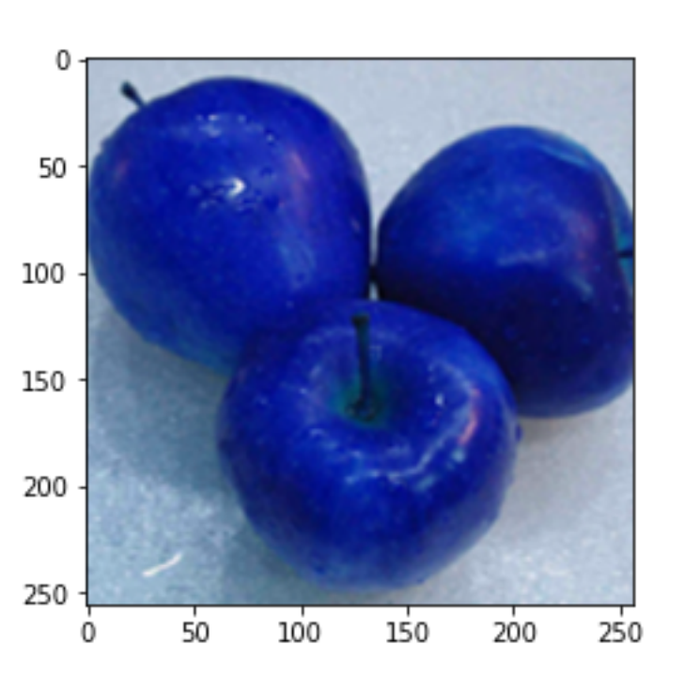
In [19]:
```python
plt.imshow(img)
```

Out[19]:



In [20]:
```python
plt.imshow(img_flag)
```

Out[20]:



In [21]:
```python
#resize the image
```

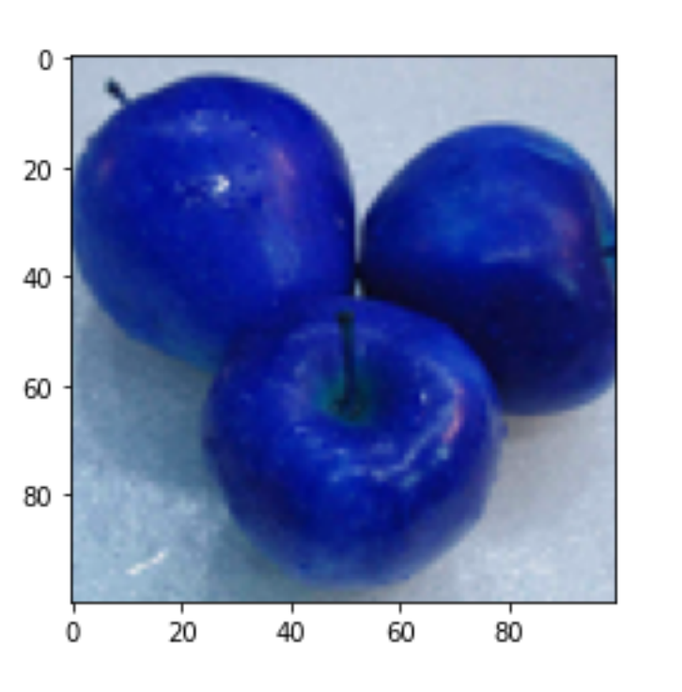
In [22]:
```python
resized_img = cv2.resize(img,(100,100))
```

In [23]:
```python
resized_img.shape
```

Out[23]: (100, 100, 3)

In [24]:
```python
plt.imshow(resized_img)
```

Out[24]:

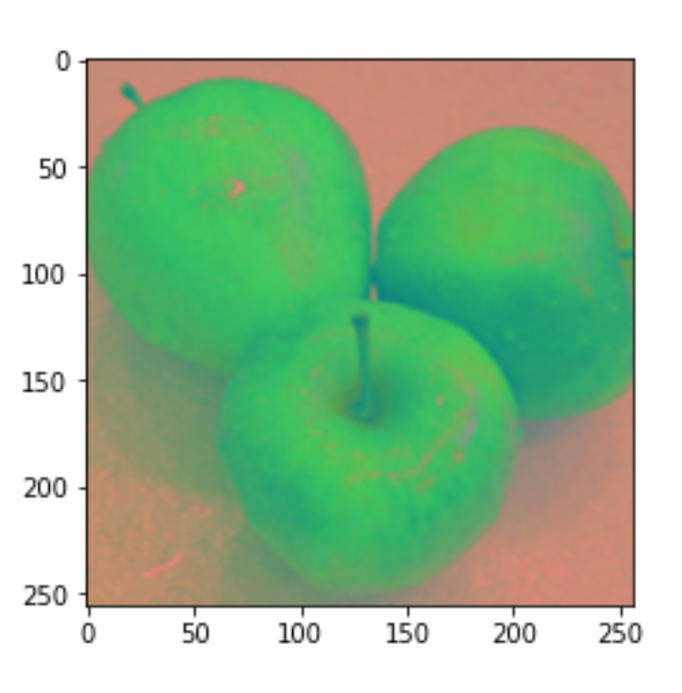


Covert color

In [25]:
```python
cv_img = cv2.cvtColor(img,cv2.COLOR_BGR2YCR_CB)
```

In [27]:
```python
plt.imshow(cv_img)
```

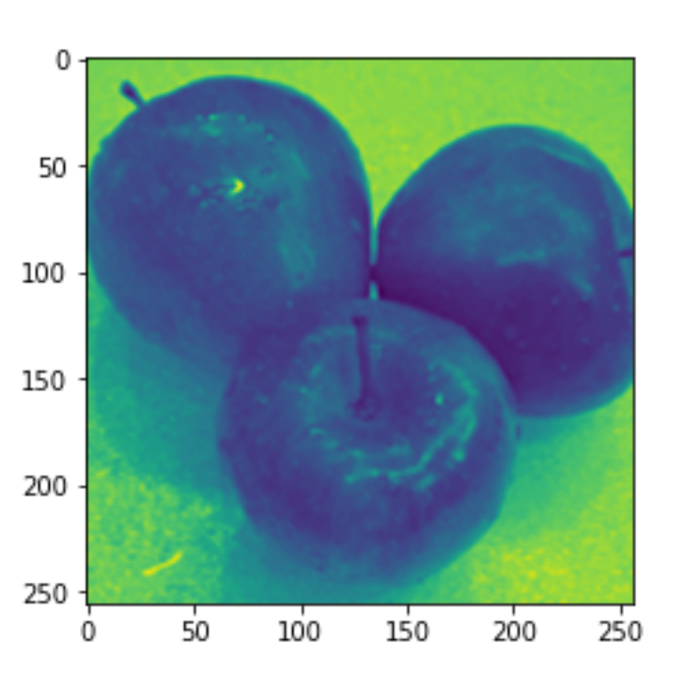
Out[27]:



In [28]:
```python
cv_img = cv2.cvtColor(img,cv2.COLOR_BGR2GRAY)
```

In [29]:
```python
plt.imshow(cv_img)
```

Out[29]:

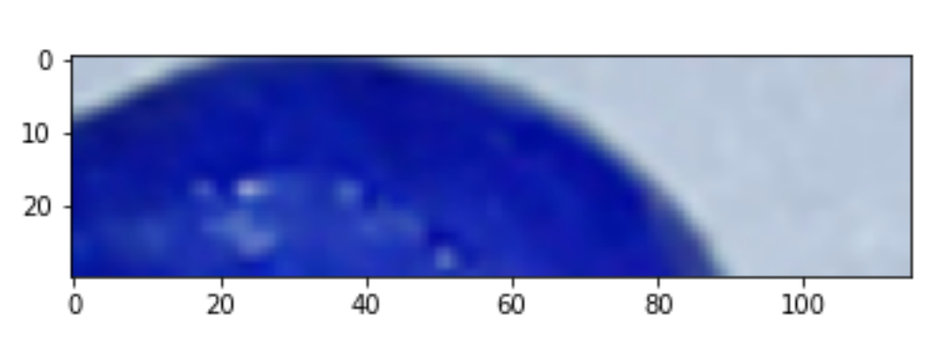


Roi or crop of image

In [30]:
```python
roi_img = img[50:280,35:150]
roi_img = img[10:40,35:150]
```

In [32]:
```python
plt.imshow(roi_img)
```

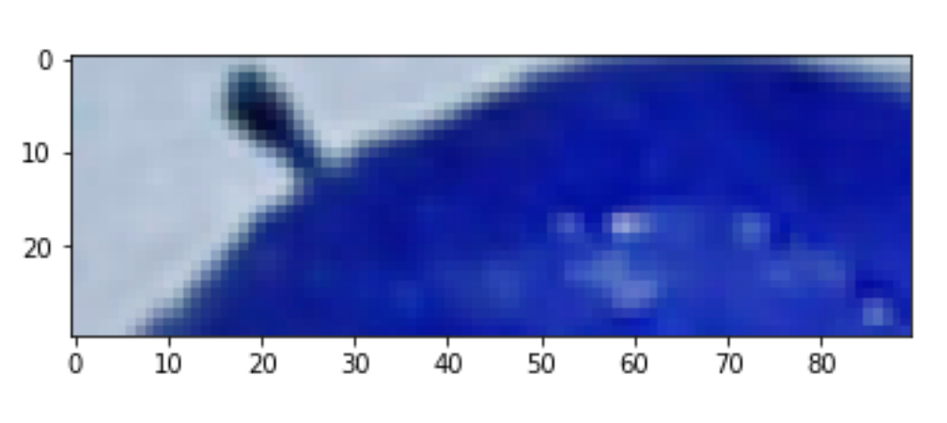
Out[32]:



In [33]:
```python
roi_img = img[10:40,0:90]
```

In [34]:
```python
plt.imshow(roi_img)
```

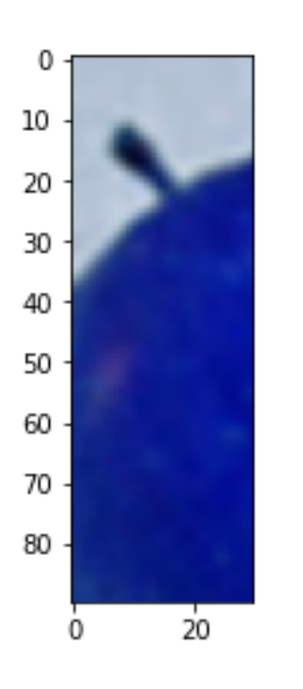
Out[34]:



In [35]:
```python
roi_img = img[0:90,10:40]
```

In [36]:
```python
plt.imshow(roi_img)
```

Out[36]:



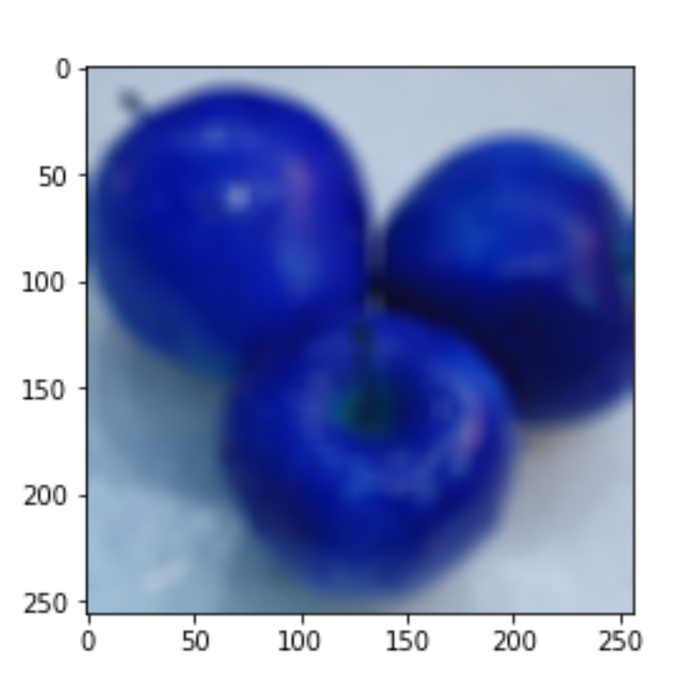
Blur or Smoothing

In [37]:
```python
# averaging
# cv2.blur() or cv2.boxFilter
```

In [38]:
```python
img_bl = cv2.blur(img,(10,10))
```

In [39]:
```python
plt.imshow(img_bl)
```

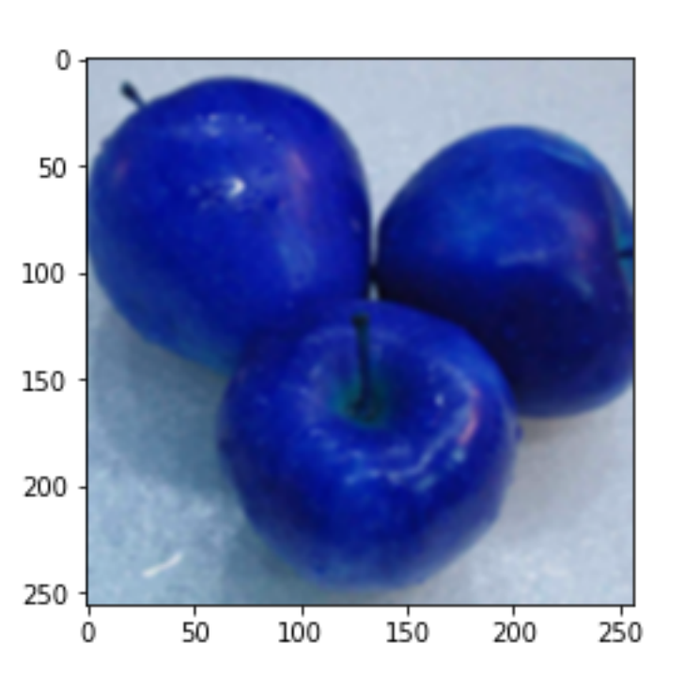
Out[39]:



In [40]:
```python
#gaussian blur
img_gbl = cv2.GaussianBlur(img,(5,5),0)
```

In [41]:
```python
plt.imshow(img_gbl)
```

Out[41]:

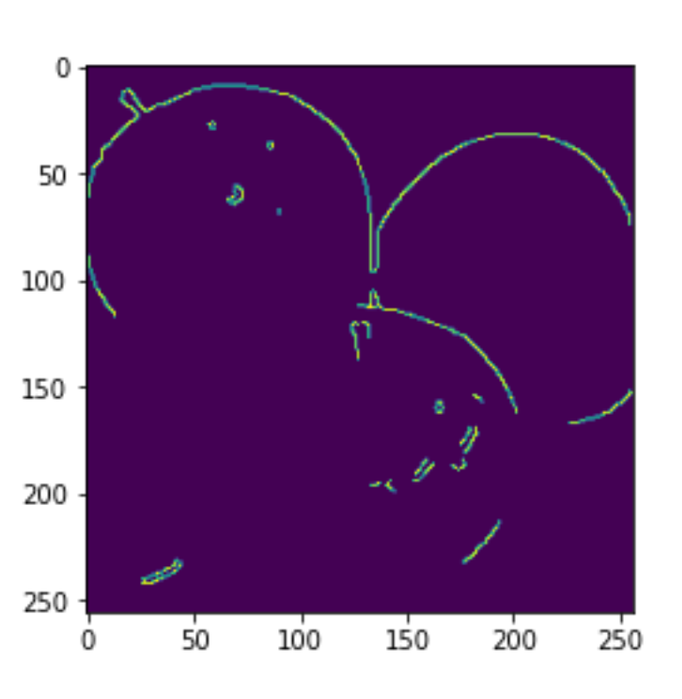


Canny edge detection

In [43]:
```python
img_edge = cv2.Canny(img,230,350)
```

In [44]:
```python
plt.imshow(img_edge)
```

Out[44]:



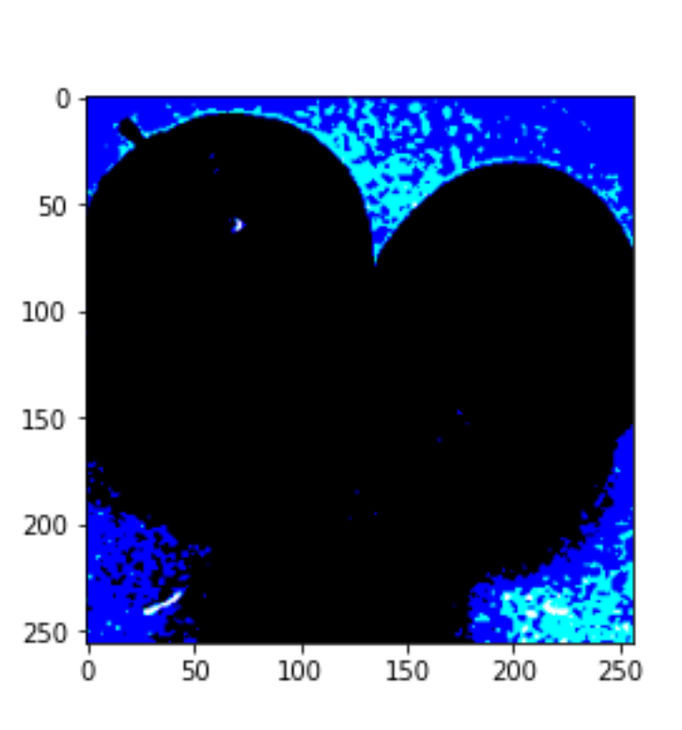
Thershold

In [45]:
```python
#binary
```

In [46]:
```python
#src -- image
#thresh
#max_value
#type -- type of thersholding
#cv2.THRESH_BINARY -- Binary Thersholding
thresh, thresh_img = cv2.threshold(img, 200, 255, cv2.THRESH_BINARY) #img
```

In [47]:
```python
plt.imshow(thresh_img)
```

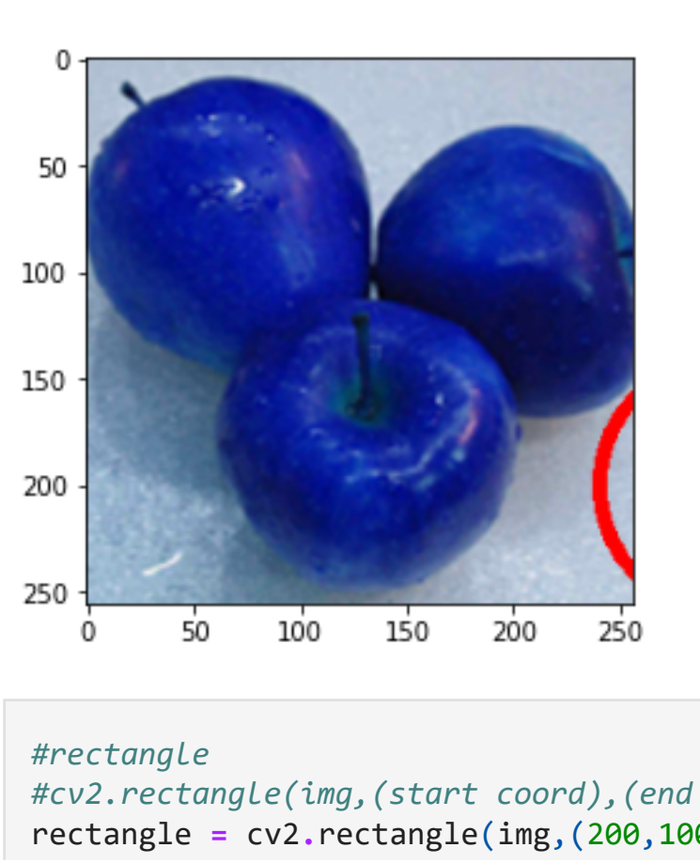
Out[47]:



In [48]:
```python
#circle
#cv2.circle(image,(center coordinates),radius,(color), thickness)
circle = cv2.circle(img,(300,200),60,(255,0,0),5)
```

In [49]:
```python
plt.imshow(img)
```

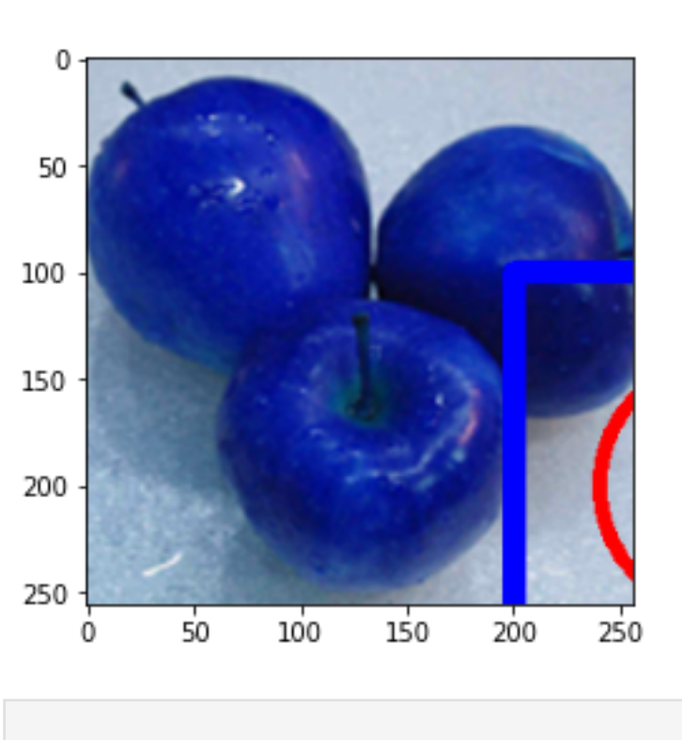
Out[49]:



In [50]:
```python
#rectangle
#cv2.rectangle(img,(start coord),(end coord),color,thickness)
rectangle = cv2.rectangle(img,(200,100),(400,300),(0,0,255),10)
```

In [51]:
```python
plt.imshow(img)
```

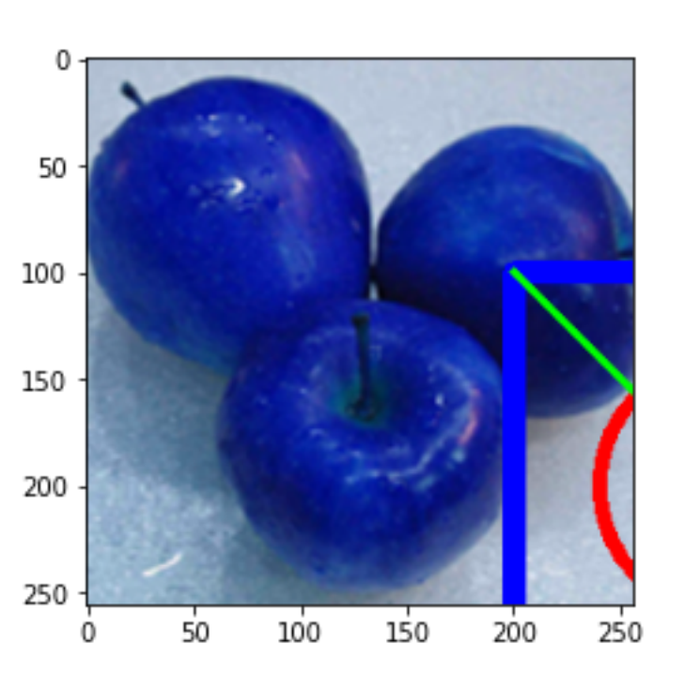
Out[51]:



In [52]:
```python
#line
#cv2.line(img,(start coord),(end coord),color,thickness)

line = cv2.line(img,(200,100),(400,300),(0,255,0),3)
```

In [53]:
```python
plt.imshow(img)
```

Out[53]:



In [54]:
```python
#creating or writing text an image
```

In [55]:
```python
#cv2.putText(img,text,(coord),fontstyle,fontscale,color,thickness)
text = cv2.putText(img,"Opencv",(200,50),cv2.FONT_HERSHEY_SIMPLEX,2,(255,255,255),5)
```

In [56]:
```python
plt.imshow(img)
```

Out[56]: