imports

In [1]:
```
%matplotlib inline
import matplotlib.pyplot as plt
from scipy.ndimage import correlate
import numpy as np
from skimage import data
from skimage.color import rgb2gray
from skimage.transform import rescale,resize
```

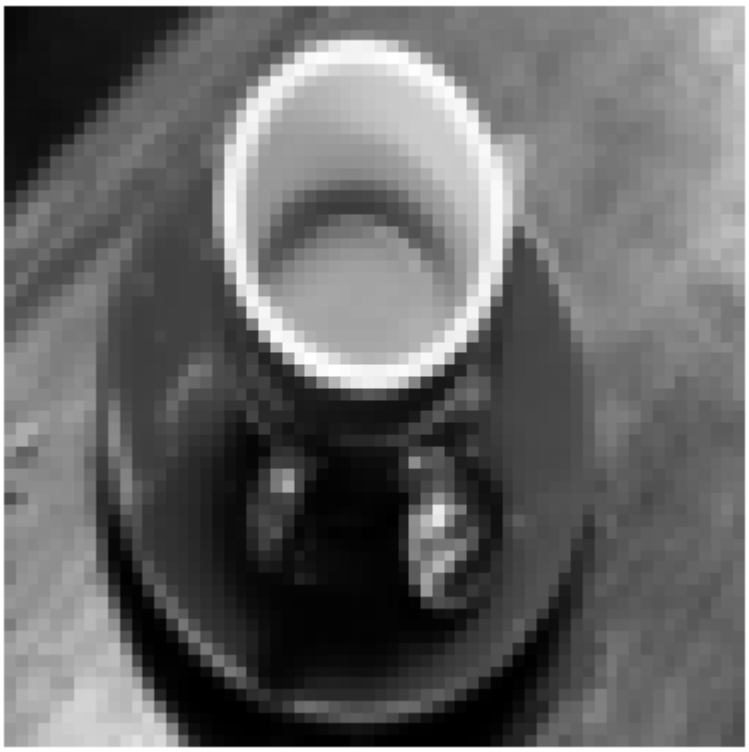
In [2]:
```
# !pip install scikit-image # install skimage if needed
```

original image input

In [3]:
```
im = rgb2gray(data.coffee())
#im = data.coffee()
im = resize(im, (64,64))
print(im.shape)

plt.axis('off')
plt.imshow(im, cmap = 'gray');

np.shape(data.coffee())
```

```
(64, 64)
```

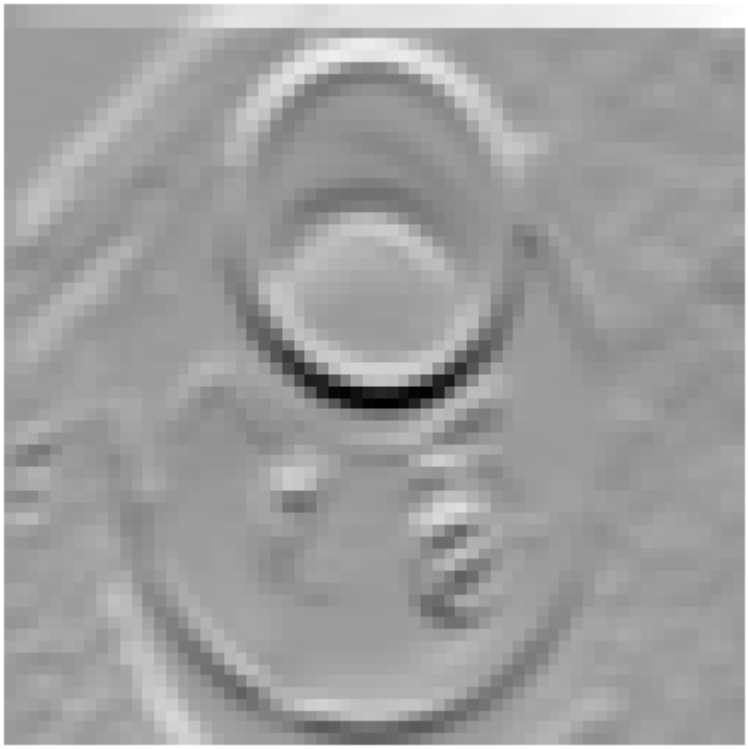
Out[3]:
```
(400, 600, 3)
```



horizontal edge filter

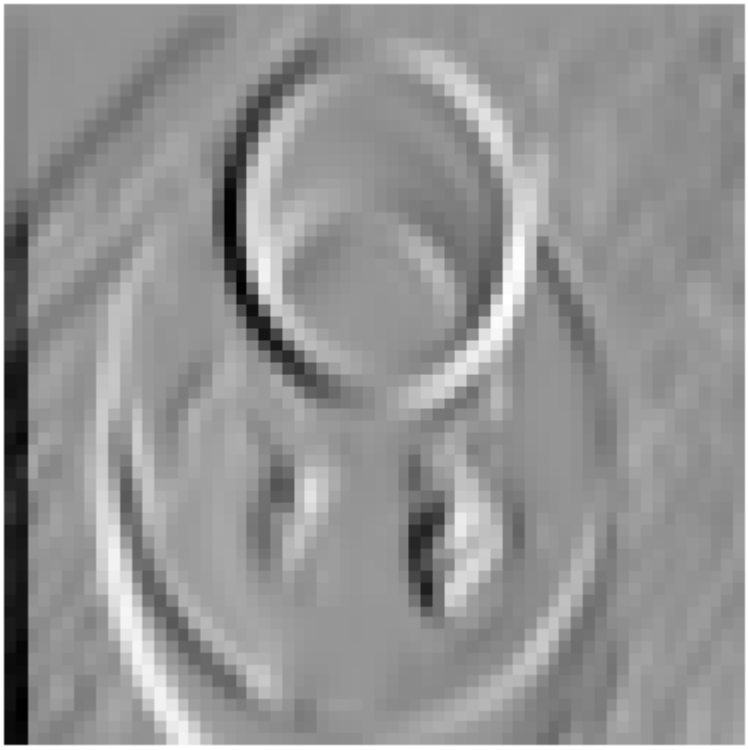
In [4]:

```
filter1 = np.array([
    [ 1,  1,  1],
    [ 0,  0,  0],
    [-1, -1, -1]
])

new_image = np.zeros(im.shape)

im_pad = np.pad(im, 1, 'constant')

for i in range(im.shape[0]):
    for j in range(im.shape[1]):
        try:
            new_image[i,j] = \
            im_pad[i-1,j-1] * filter1[0,0] + \
            im_pad[i-1,j] * filter1[0,1] + \
            im_pad[i-1,j+1] * filter1[0,2] + \
            im_pad[i,j-1] * filter1[1,0] + \
            im_pad[i,j] * filter1[1,1] + \
            im_pad[i,j+1] * filter1[1,2] +\
            im_pad[i+1,j-1] * filter1[2,0] + \
            im_pad[i+1,j] * filter1[2,1] + \
            im_pad[i+1,j+1] * filter1[2,2]
        except:
            pass

plt.axis('off')
plt.imshow(new_image, cmap='Greys');
```



vertical edge filter

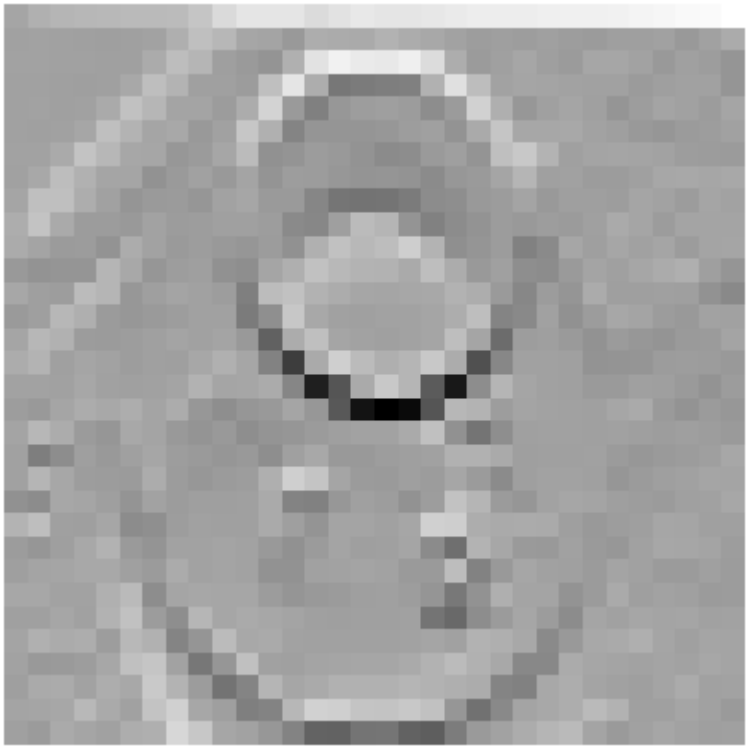
In [5]:
```
filter2 = np.array([
    [ -1,  0,  1],
    [ -1,  0,  1],
    [ -1,  0,  1]
])

new_image = np.zeros(im.shape)

im_pad = np.pad(im,1, 'constant')

for i in range(im.shape[0]):
    for j in range(im.shape[1]):
        try:
            new_image[i,j] = \
            im_pad[i-1,j-1] * filter2[0,0] + \
            im_pad[i-1,j] * filter2[0,1] + \
            im_pad[i-1,j+1] * filter2[0,2] + \
            im_pad[i,j-1] * filter2[1,0] + \
            im_pad[i,j] * filter2[1,1] + \
            im_pad[i,j+1] * filter2[1,2] +\
            im_pad[i+1,j-1] * filter2[2,0] + \
            im_pad[i+1,j] * filter2[2,1] + \
            im_pad[i+1,j+1] * filter2[2,2]
        except:
            pass

plt.axis('off')
plt.imshow(new_image, cmap='Greys');
```



horizontal edge filter with stride 2

In [6]:

```
filter1 = np.array([
    [ 1,  1,  1],
    [ 0,  0,  0],
    [-1, -1, -1]
])

stride = 2

new_image = np.zeros((int(im.shape[0] / stride), int(im.shape[1] / stride)))

im_pad = np.pad(im,1, 'constant')

for i in range(0,im.shape[0],stride):
    for j in range(0,im.shape[1],stride):
        try:
            new_image[int(i/stride),int(j/stride)] = \
            im_pad[i-1,j-1] * filter1[0,0] + \
            im_pad[i-1,j] * filter1[0,1] + \
            im_pad[i-1,j+1] * filter1[0,2] + \
            im_pad[i,j-1] * filter1[1,0] + \
            im_pad[i,j] * filter1[1,1] + \
            im_pad[i,j+1] * filter1[1,2] +\
            im_pad[i+1,j-1] * filter1[2,0] + \
            im_pad[i+1,j] * filter1[2,1] + \
            im_pad[i+1,j+1] * filter1[2,2]
        except:
            pass

plt.axis('off')
plt.imshow(new_image, cmap='Greys');
```

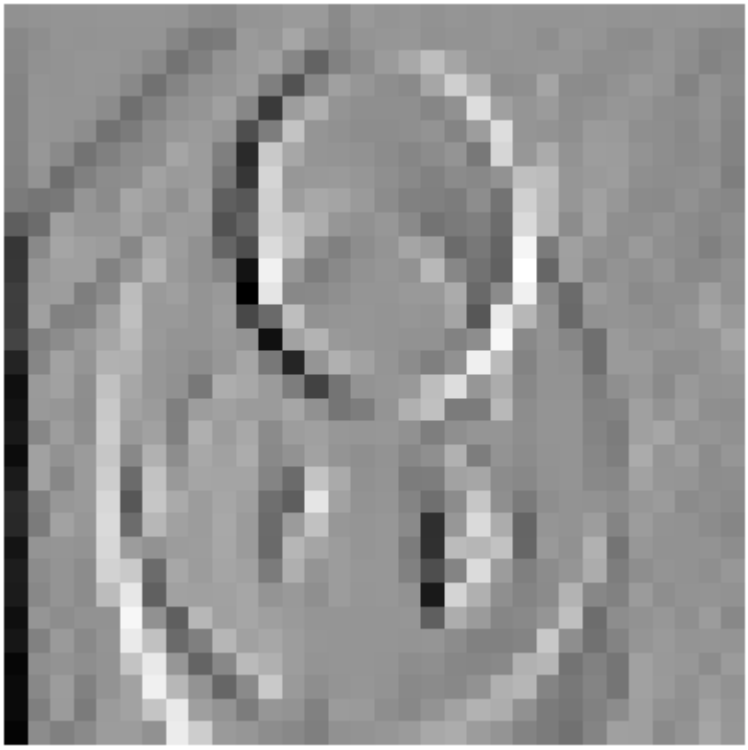


vertical edge filter with stride 2

In [7]:

```
filter2 = np.array([
    [ -1,  0,  1],
    [ -1,  0,  1],
    [ -1,  0,  1]
])

stride = 2

new_image = np.zeros((int(im.shape[0] / stride), int(im.shape[1] / stride)))

im_pad = np.pad(im,1, 'constant')

for i in range(0,im.shape[0],stride):
    for j in range(0,im.shape[1],stride):
        try:
            new_image[int(i/stride),int(j/stride)] = \
            im_pad[i-1,j-1] * filter2[0,0] + \
            im_pad[i-1,j] * filter2[0,1] + \
            im_pad[i-1,j+1] * filter2[0,2] + \
            im_pad[i,j-1] * filter2[1,0] + \
            im_pad[i,j] * filter2[1,1] + \
            im_pad[i,j+1] * filter2[1,2] +\
            im_pad[i+1,j-1] * filter2[2,0] + \
            im_pad[i+1,j] * filter2[2,1] + \
            im_pad[i+1,j+1] * filter2[2,2]
        except:
            pass

plt.axis('off')
plt.imshow(new_image, cmap='Greys');
print (np.shape(new_image))
```

```
(32, 32)
```



In [ ]:

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