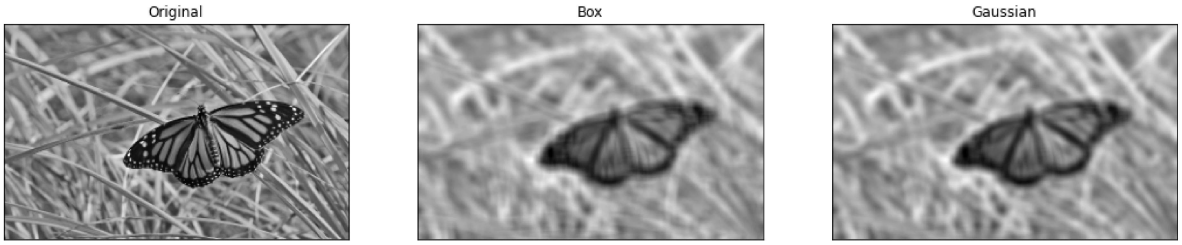
Excercise -03

190539T - T.Sajeepan

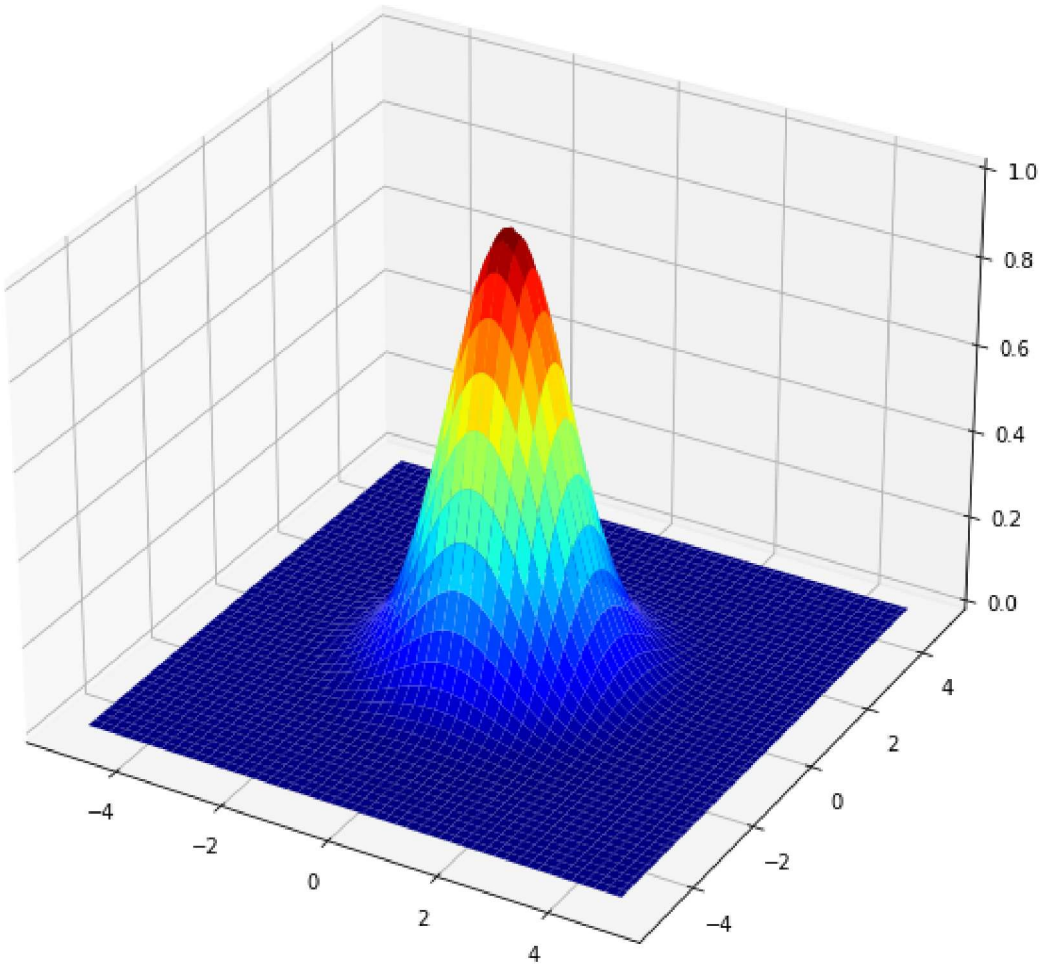
Question -01

In [ ]:
```
#  Box filer
%matplotlib inline
import cv2 as cv
import matplotlib.pyplot as plt
import numpy as np
from scipy import stats

img = cv.imread('butterfly.jpg', cv.IMREAD_REDUCED_GRAYSCALE_4)

# Box filter
box_kernal = 1./81.*np.ones((9,9))
imgb = cv.filter2D(img,-1,box_kernal)


# Box filter
gaus = cv.getGaussianKernel(9, 4)
img_gaus = cv.sepFilter2D(img, -1, gaus, gaus)

fig, axes  = plt.subplots(1,3, sharex='all', sharey='all', figsize=(18,18))
axes[0].imshow(img, cmap='gray')
axes[0].set_title('Original')
axes[0].set_xticks([]), axes[0].set_yticks([])
axes[1].imshow(imgb, cmap='gray')
axes[1].set_title('Box')
axes[1].set_xticks([]), axes[1].set_yticks([])
axes[2].imshow(img_gaus, cmap='gray')
axes[2].set_title('Gaussian')
axes[2].set_xticks([]), axes[1].set_yticks([])
plt.show()
```



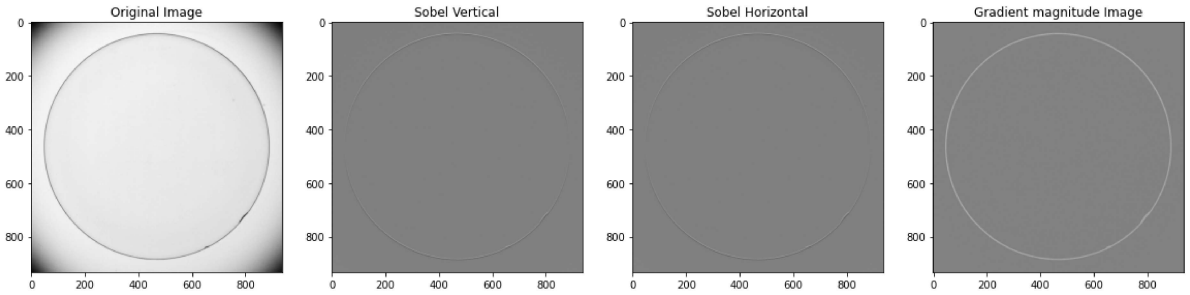
Question -02

In [ ]:
```
from matplotlib import cm
sigma = 1
X = np.arange(-5, 5, 0.1)
Y = np.arange(-5, 5, 0.1)
X, Y = np.meshgrid(X, Y)
Z = np.exp(-(X**2 + Y**2)/(2*sigma**2))
fig = plt.figure(figsize=(10,10))
ax = fig.add_subplot(111, projection='3d')
ax.plot_surface(X,Y,Z, cmap=cm.jet)
plt.show()
```



Question -03

In [ ]:
```
import cv2 as cv
import numpy as np
from matplotlib import pyplot as plt

img = cv.imread('contact_lens.tif', cv2.IMREAD_GRAYSCALE).astype(np.float32)

Kernelx = np.array([[-1, 0, 1], [-2, 0, 2], [-1, 0, 1]])
Kernely = np.array([[1, 2, 1], [0, 0, 0], [-1, -2, -1]])

sobelx = cv.filter2D(img, -1, Kernelx)
sobely = cv.filter2D(img, -1, Kernely)

gm=np.sqrt(sobelx**2 +sobely**2)

fig, axes = plt.subplots(1,4, figsize=(20,30))
axes[0].imshow(img, cmap='gray')
axes[0].set_title('Original Image')
axes[1].imshow(sobely, cmap='gray',vmin=-1020,vmax=1020)
axes[1].set_title('Sobel Vertical')
axes[2].imshow(sobely, cmap='gray',vmin=-1020,vmax=1020)
axes[2].set_title('Sobel Horizontal')
axes[3].imshow(gm, cmap='gray',vmin=-1020,vmax=1020)
axes[3].set_title('Gradient magnitude Image')
plt.show()
```



Question -04

In [ ]:
```
# Sharpening

%matplotlib inline
import cv2 as cv
import numpy as np
from matplotlib import pyplot as plt

f = cv.imread('tom.jpg', cv.IMREAD_GRAYSCALE).astype(np.float32)

sigma =2
g_filt = cv.getGaussianKernel(5,sigma)
f_lp = cv.sepFilter2D(f,-1,g_filt,g_filt)

f_hp= f-f_lp;

img_sharp=cv.addWeighted(f,1.0,f_hp,1.5,0)

fig, axes  = plt.subplots(1,2, sharex='all', sharey='all', figsize=(18,18))
axes[0].imshow(f, cmap='gray')
axes[0].set_title('Original image')
axes[0].set_xticks([]), axes[0].set_yticks([])
axes[1].imshow(img_sharp, cmap='gray')
axes[1].set_title('Sharpened image')
axes[1].set_xticks([]), axes[1].set_yticks([])
plt.show()
```

In [ ]: