## Exercise1 01

import math

import matplotlib

%matplotlib inline

from matplotlib import pyplot as plt

from mpl\_toolkits.mplot3d import Axes3D

import numpy

R=numpy.arange(-4,4+1e-9,0.1)

X,Y=numpy.meshgrid(R,R)

F=(1/(sum(sum((math.e)\*\*(-0.5\*(X\*\*2+Y\*\*2))))))\*((math.e)\*\*(-0.5\*(X\*\*2+Y\*\*2)))

fig=plt.figure(figsize=(10,6))

ax=plt.axes(projection='3d')

ax.scatter(X, Y, F, s=1, alpha=0.5)

## Exercise2 01

import math

import matplotlib

%matplotlib inline

from matplotlib import pyplot as plt

from mpl\_toolkits.mplot3d import Axes3D

import numpy

R=numpy.arange(-4,4+1e-9,0.1)

X,Y=numpy.meshgrid(R,R)

Z1=(math.e)\*\*(-0.5\*((X+0.5)\*\*2+2\*(Y+0.5)\*\*2))

Z2=(math.e)\*\*(-0.5\*((X-0.5)\*\*2+2\*(Y-0.5)\*\*2))

F1=(1/(sum(sum(Z1))))\*Z1

F2=(1/(sum(sum(Z2))))\*Z2

fig=plt.figure(figsize=(10,6))

ax=plt.axes(projection='3d')

ax.scatter(X, Y, F1, s=1, alpha=0.5, color='blue')

ax.scatter(X, Y, F2, s=1, alpha=0.5, color='red')

## Exercise2 02

import math

import matplotlib

%matplotlib inline

from matplotlib import pyplot as plt

from mpl\_toolkits.mplot3d import Axes3D

import numpy

R=numpy.arange(-4,4+1e-9,0.1)

X,Y=numpy.meshgrid(R,R)

Z=((math.e)\*\*(-0.5\*((X+0.5)\*\*2+2\*(Y+0.5)\*\*2)))\*0.9+((math.e)\*\*(-0.5\*((X-0.5)\*\*2+2\*(Y-0.5)\*\*2)))\*0.1

F=(1/(sum(sum(Z))))\*Z

fig=plt.figure(figsize=(10,6))

ax=plt.axes(projection='3d')

ax.scatter(X, Y, F, s=1, alpha=0.5)

## Exercise2 03

import math

import matplotlib

%matplotlib inline

from matplotlib import pyplot as plt

from mpl\_toolkits.mplot3d import Axes3D

import numpy

R=numpy.arange(-4,4+1e-9,0.1)

X,Y=numpy.meshgrid(R,R)

Z1=(math.e)\*\*(-0.5\*((X+0.5)\*\*2+2\*(Y+0.5)\*\*2))

Z2=(math.e)\*\*(-0.5\*((X-0.5)\*\*2+2\*(Y-0.5)\*\*2))

F1=(1/(sum(sum(Z1))))\*Z1

F2=(1/(sum(sum(Z2))))\*Z2

F=0.9\*F1+0.1\*F2

G1=F1\*0.9/F

G2=F2\*0.1/F

fig=plt.figure(figsize=(10,6))

ax=plt.axes(projection='3d')

ax.scatter(X, Y, G1, s=1, alpha=0.5, color='blue')

ax.scatter(X, Y, G2, s=1, alpha=0.5, color='red')

G3=numpy.minimum(F1\*0.9, F2\*0.1)

error = sum(sum(G3))

print(error)

## Exercise3 01

import math

import matplotlib

%matplotlib inline

from matplotlib import pyplot as plt

from mpl\_toolkits.mplot3d import Axes3D

import numpy

R=numpy.arange(-4,4+1e-9,0.1)

X,Y=numpy.meshgrid(R,R)

Z1=(math.e)\*\*(-0.5\*((X+0.5)\*\*2+2\*(Y+0.5)\*\*2))

Z2=(math.e)\*\*(-2\*((X-0.5)\*\*2)-4\*(Y-0.5)\*\*2)

F1=(1/(sum(sum(Z1))))\*Z1

F2=(1/(sum(sum(Z2))))\*Z2

F=0.9\*F1+0.1\*F2

G1=F1\*0.9/F

G2=F2\*0.1/F

fig=plt.figure(figsize=(10,6))

ax=plt.axes(projection='3d')

ax.scatter(X, Y, G1, s=1, alpha=0.5, color='blue')

ax.scatter(X, Y, G2, s=1, alpha=0.5, color='red')

#Byes error rate

G3=numpy.minimum(F1\*0.9, F2\*0.1)

error = sum(sum(G3))

print(error)