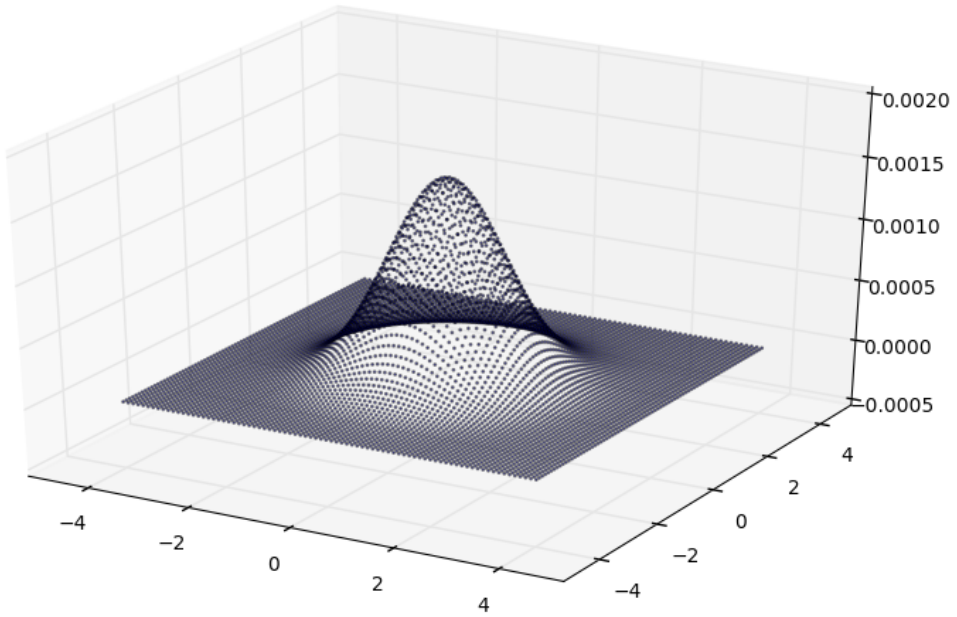
Exercise01

November 4, 2016

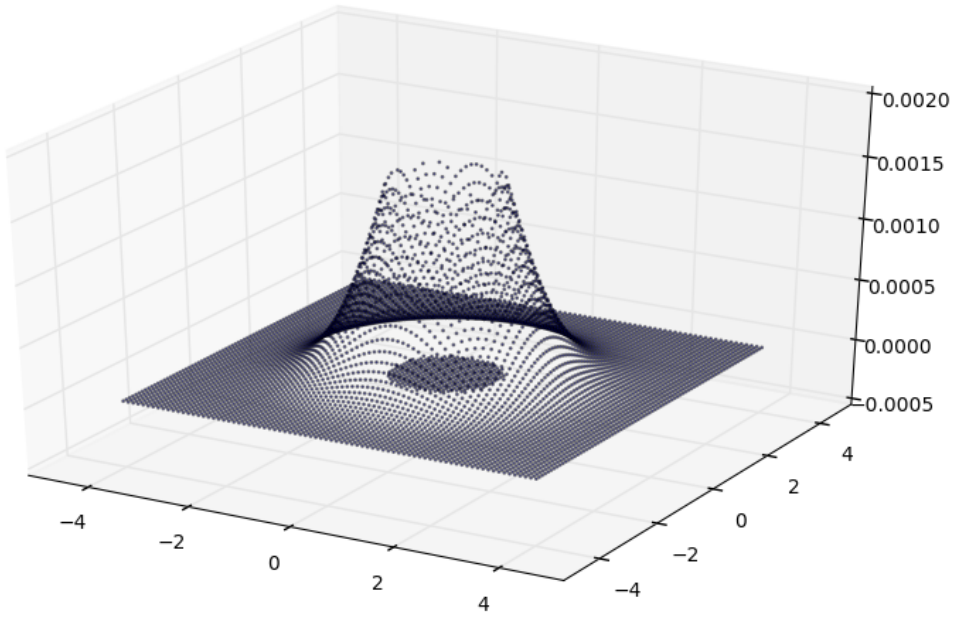
In [1]:
```
## Exercise1 01

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

Out[1]:
```
<mpl_toolkits.mplot3d.art3d.Path3DCollection at 0x10a8a3510>
```



In [2]:
```
## Exercise1 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)
li = list(zip(X.flatten(),Y.flatten()))
Z = 0
for i in li:
    if (i[0]**2 + i[1]**2)**.5 >= 1:
        Z += math.e**(-0.5*(i[0]**2+i[1]**2))
F=(1/Z)*((math.e)**(-0.5*(X**2+Y**2)))
test = (X**2 + Y**2)**.5 >= 1
F[~test] = 0

fig=plt.figure(figsize=(10,6))
ax=plt.axes(projection='3d')
ax.scatter(X, Y, F, s=1, alpha=0.5)
```

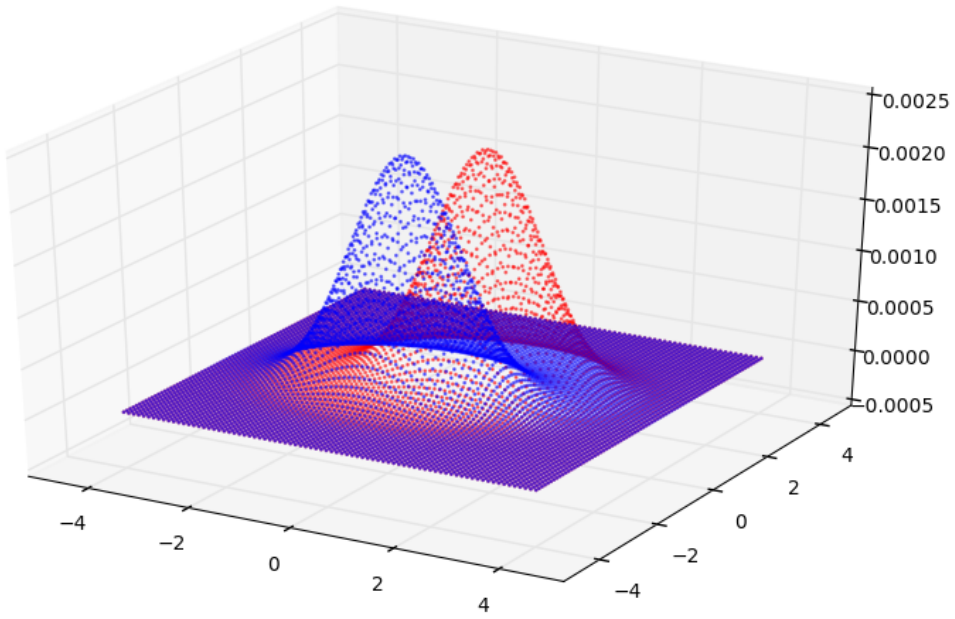
Out[2]: <mpl_toolkits.mplot3d.art3d.Path3DCollection at 0x10d5f7390>



In [72]:
```
## Exercise1 03

 # -- still missing :( --
```

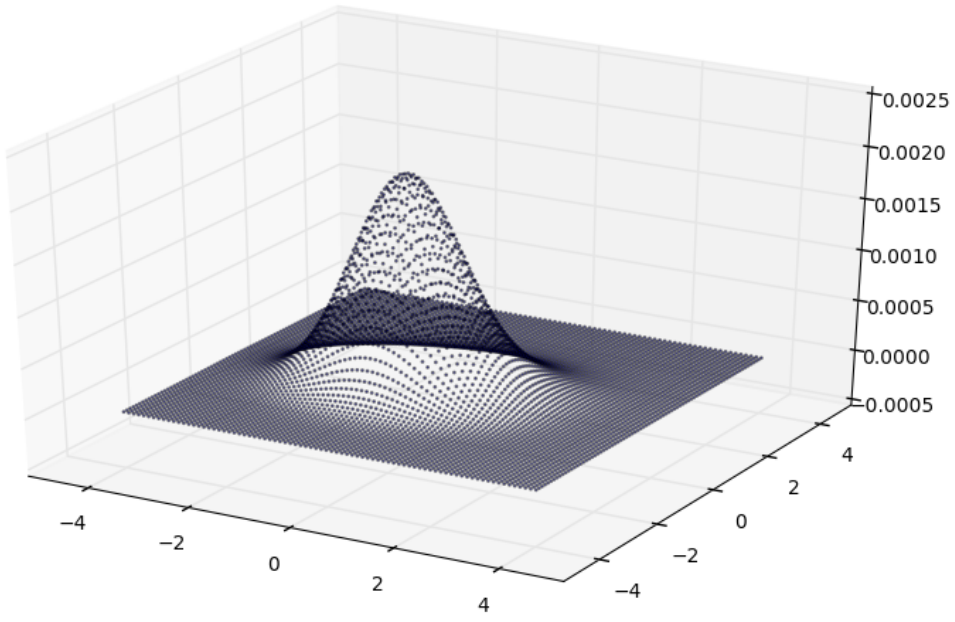
In [3]:
```
## Exercise2 01

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')
```

Out[3]:
```
<mpl_toolkits.mplot3d.art3d.Path3DCollection at 0x10dd831d0>
```



In [4]:
```
## 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)
Z1=((math.e)**(-0.5*((X+0.5)**2+2*(Y+0.5)**2)))*0.9
Z2=((math.e)**(-0.5*((X-0.5)**2+2*(Y-0.5)**2)))*0.1
Z=Z1+Z2
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)
```

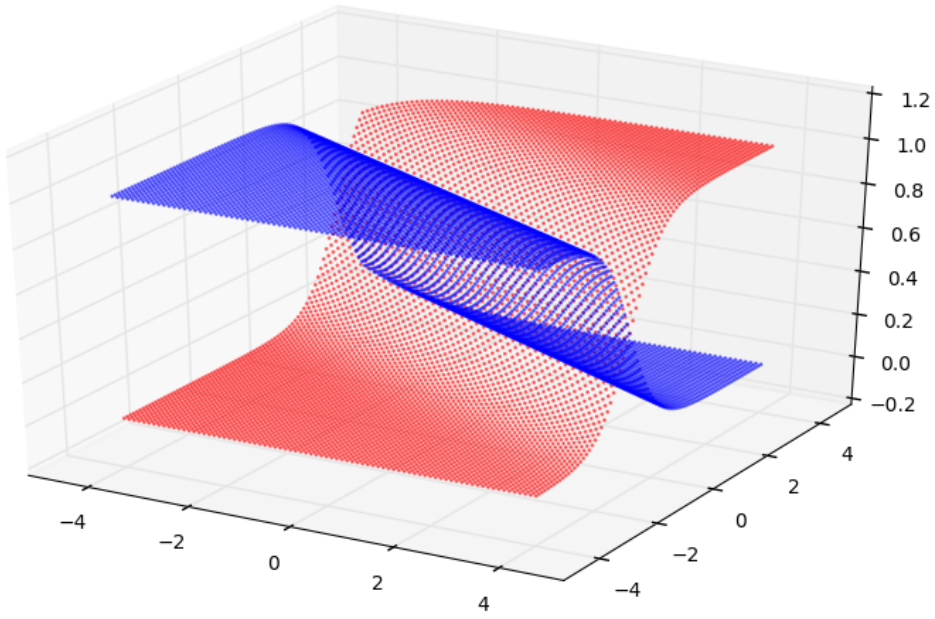
Out[4]: <mpl_toolkits.mplot3d.art3d.Path3DCollection at 0x10ddb4310>



In [5]:
```
## Exercise2 03

import math
import matplotlib
%matplotlib inline
```

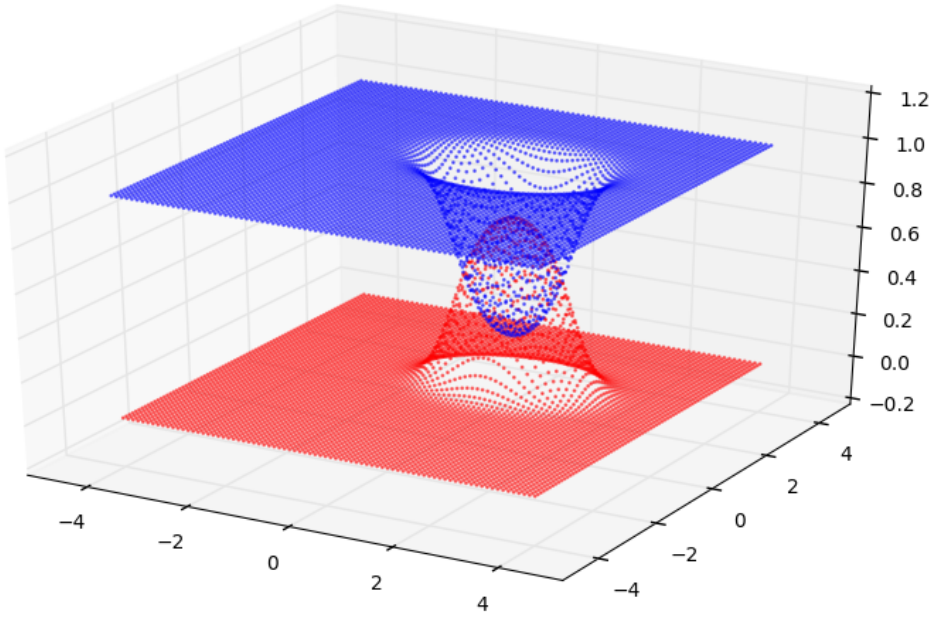
```
from matplotlib import pyplot as plt
from mpl_toolkits.mplot3d import Axes3D
import numpy
R=numpy.arange(-4,4+1e-9,0.1)
X,Y=numpy.meshgrid(R,R)

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)
```

```
0.0804211752474
```



In [6]:
```
## 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)
```

```
0.072907805557
```



In [ ]: