

Final Project - Monte Carlo integration

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Reference - Professor Brant's lecture slide 17 example for Monte carlo integration

```
In [105]: 1 %matplotlib inline
          2 import matplotlib.pyplot as plt
          3 import numpy as np
          4
```

Set some parameters of the integration

```
In [106]: 1 n = 10000 #number of samples for the integration
```

Making some unifromly sampled variables [-1,1]

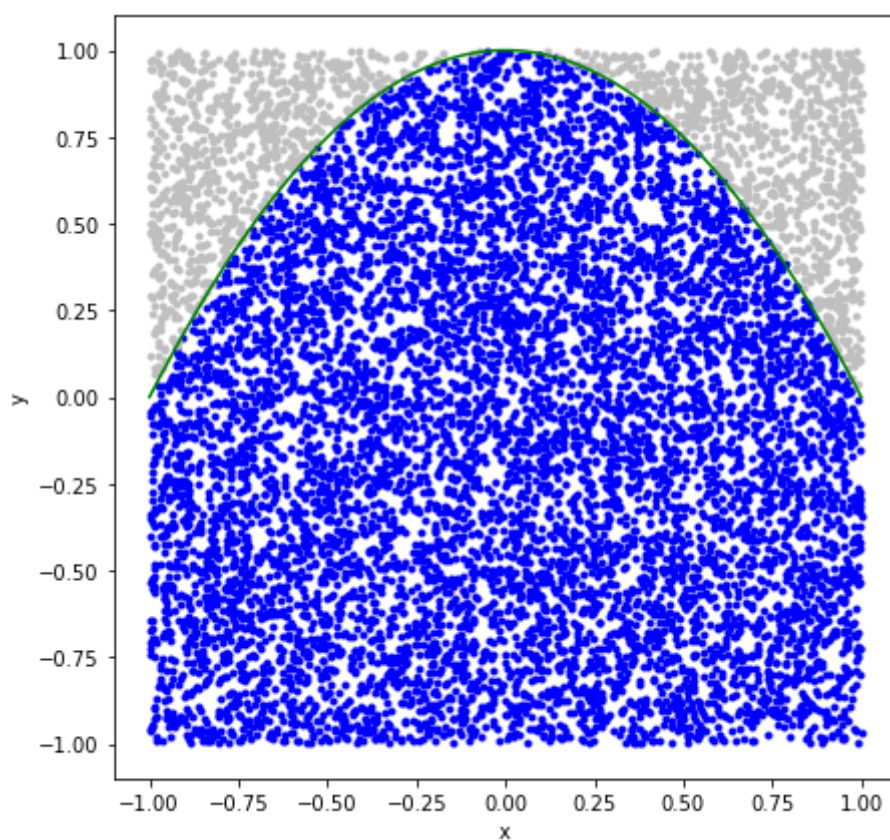
```
In [107]: 1 x = np.random.uniform(-1,1,n)
          2 y = np.random.uniform(-1,1,n)
```

Finding the number of samples within the function

```
In [108]: 1 ir = np.where((x**2 + y)<1.0)[0]
          2 ur = np.where((x**2 + y)>=1.0)[0]
```

Plotting the samples and the function

```
In [109]: 1 fig = plt.figure(figsize = (7,7))
          2 plt.xlim([-1.1,1.1])
          3 plt.ylim([-1.1,1.1])
          4 plt.plot(x[ir],y[ir], '.', color = "blue")
          5 plt.plot(x[ur],y[ur], '.', color = "0.75")
          6 theta = np.linspace(0,np.pi,1000)
          7 xc = np.cos(theta)
          8 yc = np.sin(theta)**2
          9 plt.plot(xc,yc,color="green")
         10
         11 plt.xlabel('x')
         12 plt.ylabel('y')
         13 plt.show()
```



```
In [ ]: 1
```