2_4

March 28, 2016

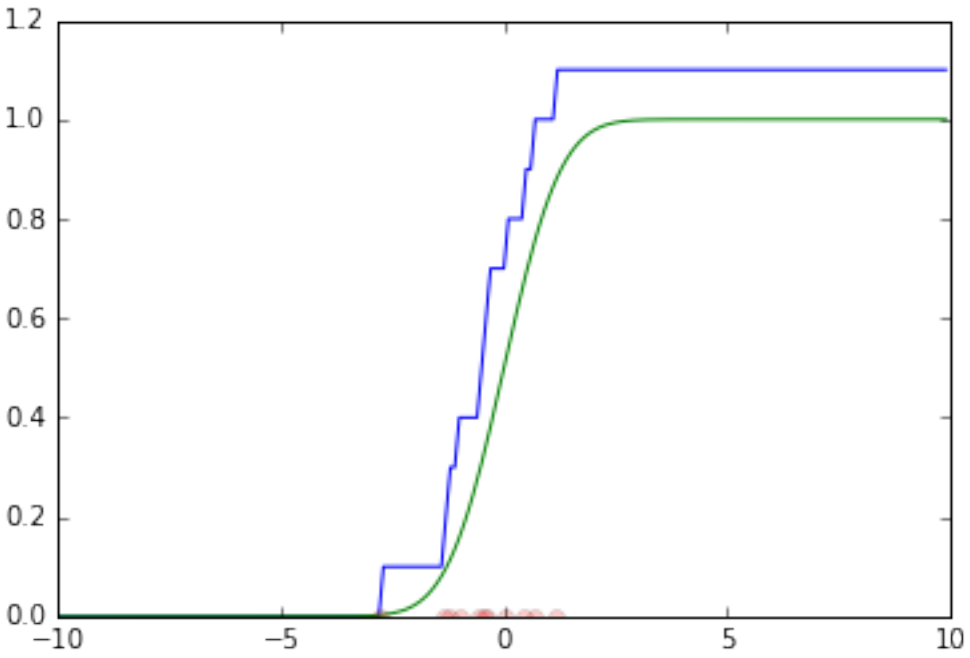
In [10]:
```
__author__ = 'Security'
import numpy as np
import scipy.stats as stats
%matplotlib inline
import matplotlib.pyplot as plt
from multiprocessing.dummy import Pool
```

In [3]:
```
N = 10000
sample = stats.norm.rvs(size=N)
```

In [4]:
```
def F(n, x):
    sampleSlice = sample[:n+1]
    return 1/float(n) * len(list(filter((lambda s: s < x), sampleSlice)))

def Freal(x):
    return 0.5 + np.math.erf(x/(np.math.sqrt(2))) / 2

def drawPlotFor(n):
    presentationRange = np.arange(-10, 10, 0.1)
    plt.plot(presentationRange, [F(n, x) for x in presentationRange])
    plt.plot(presentationRange, [Freal(x) for x in presentationRange])
    plt.plot(sample[:n+1], np.zeros(n+1), 'ro', alpha=0.2)
    plt.show()

def drawPlots(ns):
    for n in ns:
        drawPlotFor(n)
```

In [5]:
```
ns = [10, 25, 50, 100, 1000, 5000, N-1]
n = [N]
```

In [6]:
```
drawPlots(ns)
```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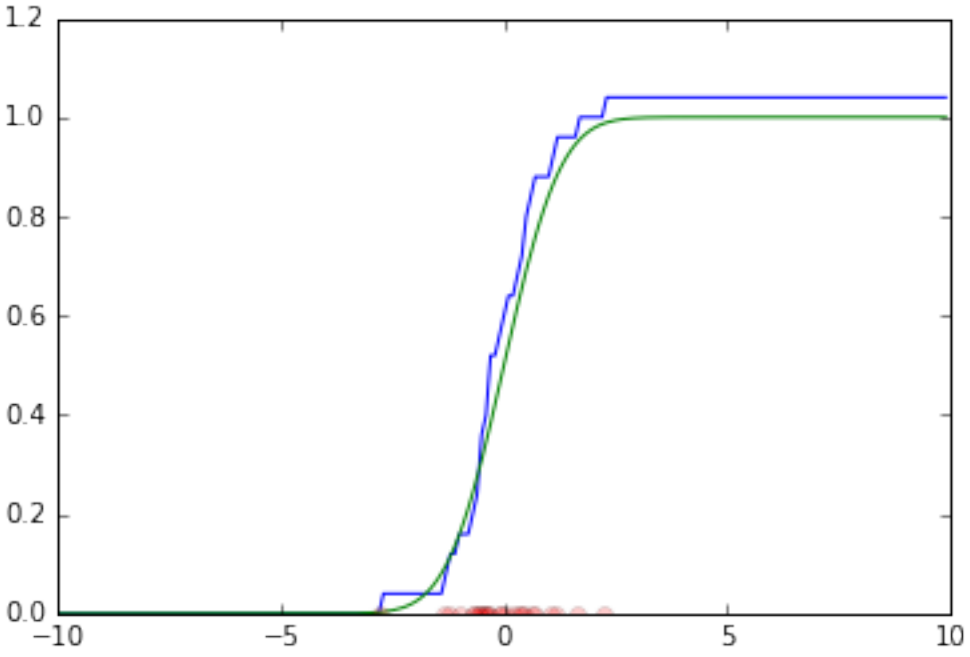
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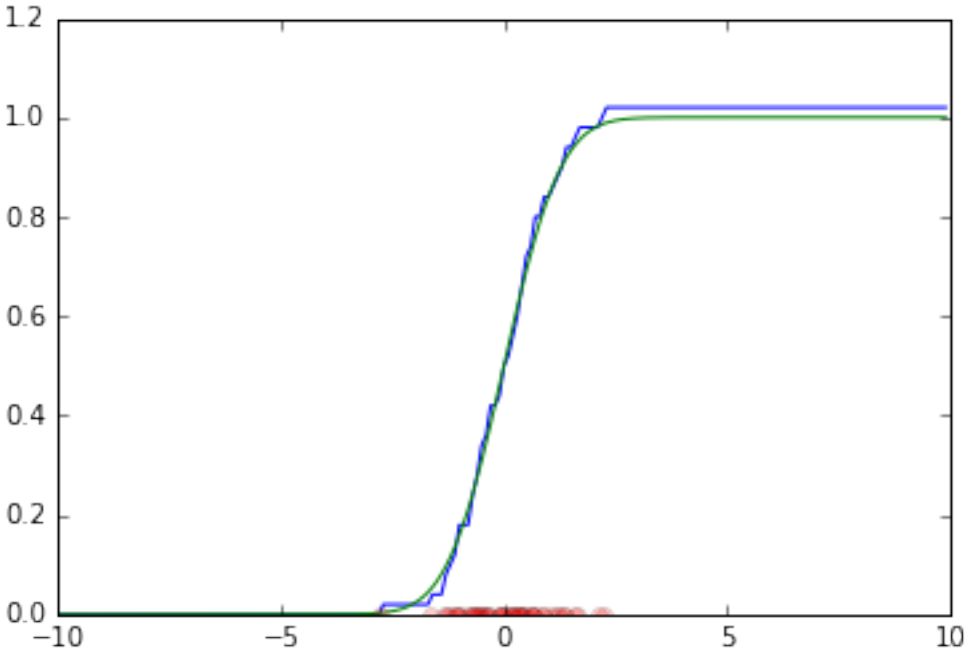
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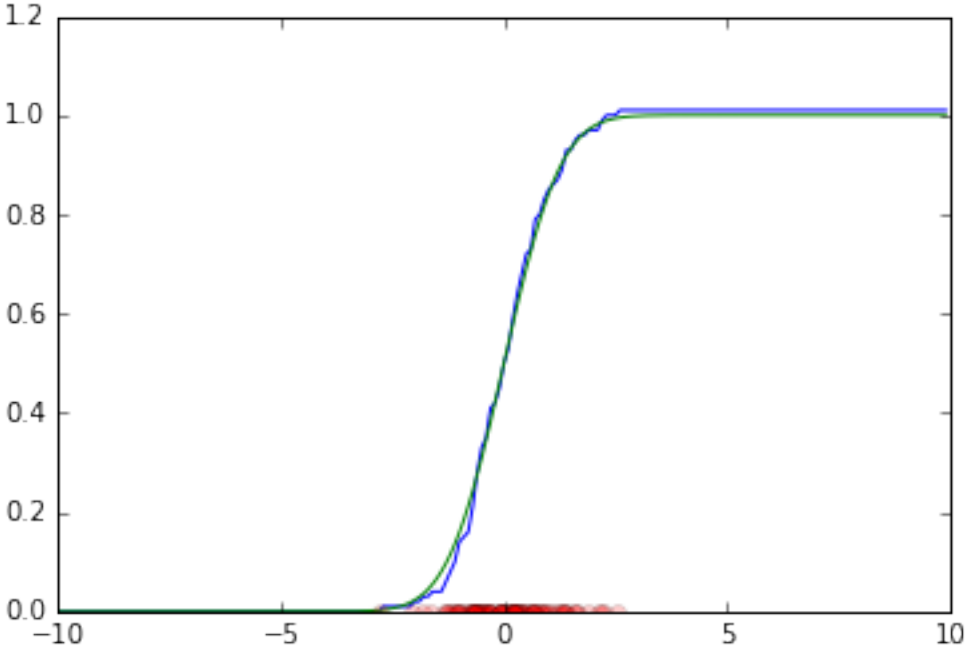
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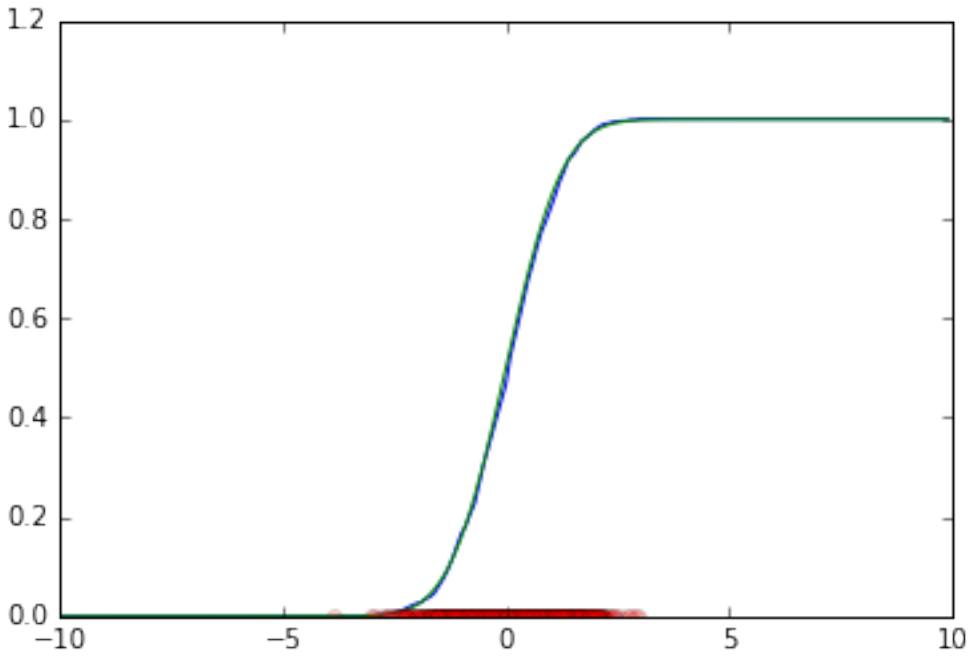
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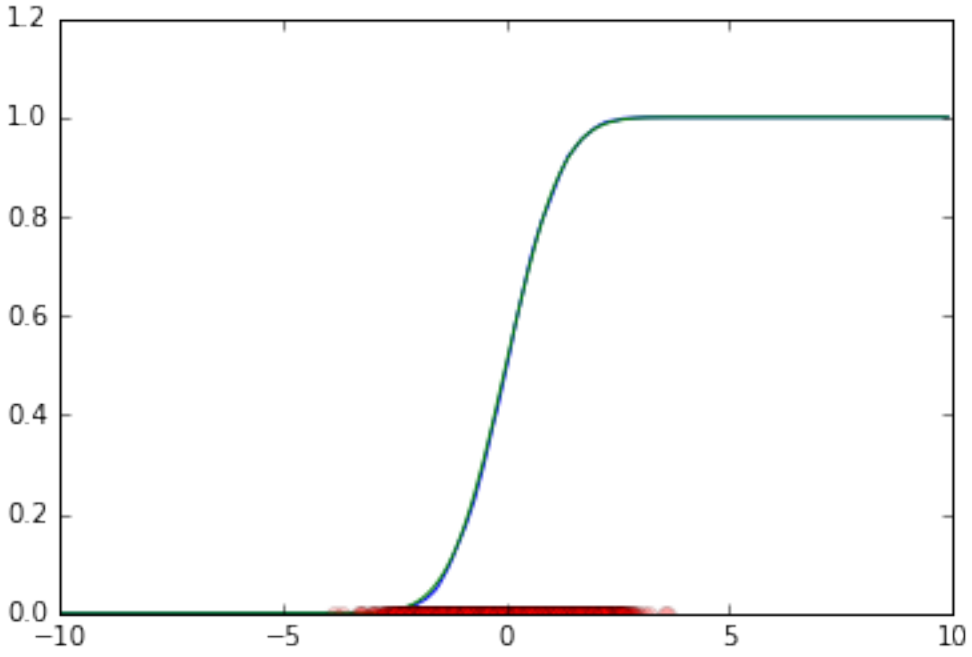
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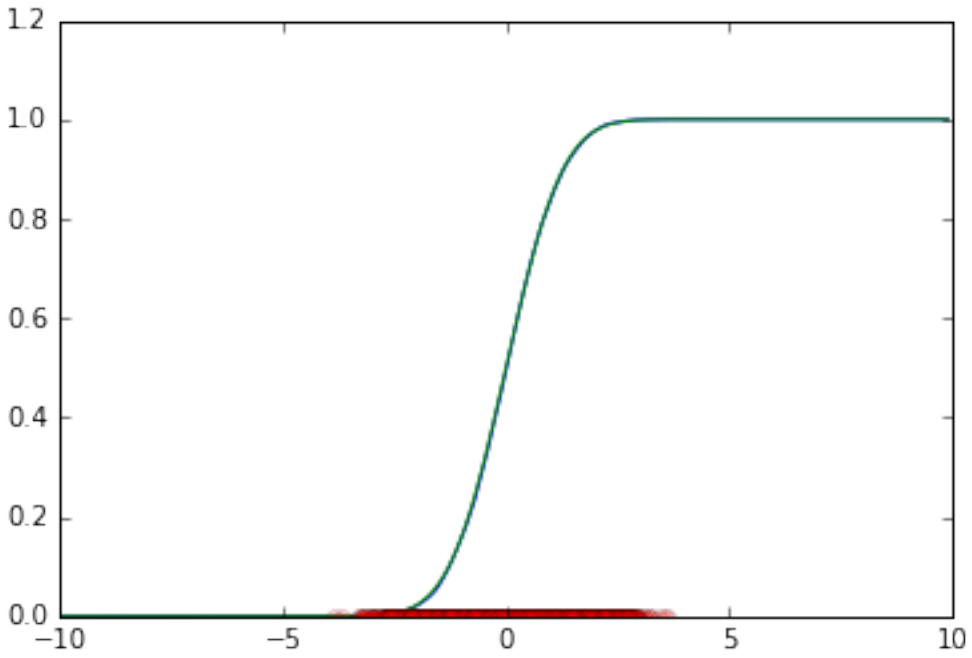
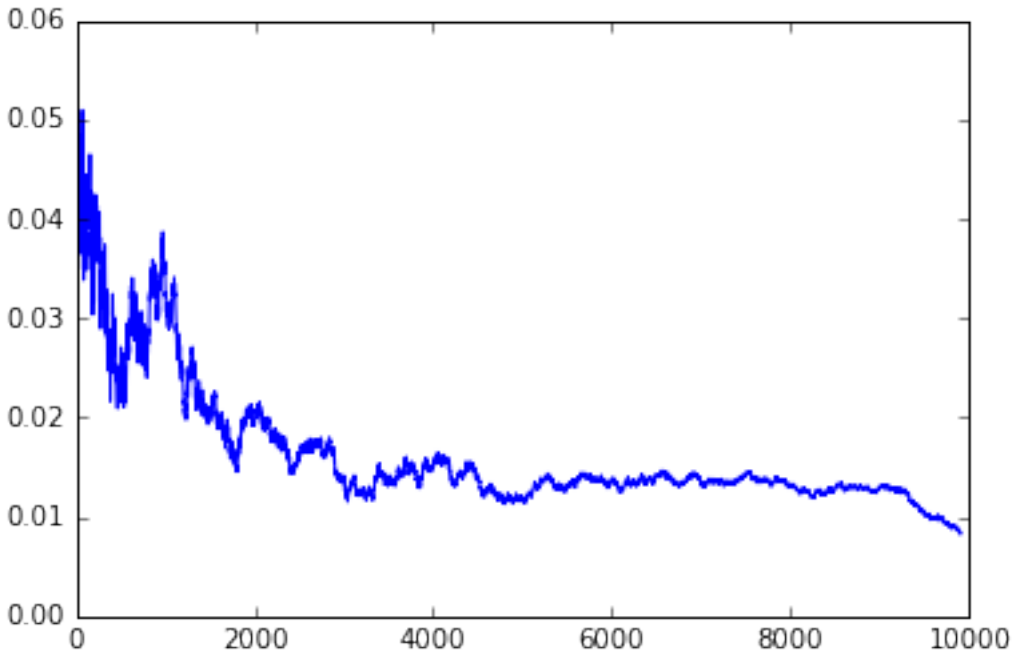



```
In [8]: def D(n):
            presentationRange = np.arange(-10, 10, 0.1)
            return np.max(np.abs(np.array([F(n, x) for x in presentationRange]) - np.array([Freal(x) for
```

```
In [11]: maxSize = 10000
         parts = 100
         ds =[[0.0] for _ in range(parts)]

         def calculateDs(i):
             ds[i] = [D(n) for n in range(int((maxSize * i) / parts), int((maxSize * (i+1)) / parts))]
         pool = Pool(4)
         pool.map(calculateDs, range(1, parts))
         data = []
         for i in range(1, parts):
             for d in ds[i]:
                 data.append(d)
```

```
In [12]: plt.plot(data)
         plt.show()
```



In [ ]: