PJ01_2

November 11, 2018

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

In [2]:
```
from math import *
def f(x):
    if x==0:
        return 0
    else :
        return sqrt(x)*log(x)
```

In [3]:
```
def get_n(a, b, h):
    n = int((b-a)/h)
    if n % 2 == 1:
        n = n + 1
    return n
```

In [4]:
```
def generate_data(a, b, h):
    n = get_n(a, b, h)
    data = []
    x = a
    for i in range(n):
        data.append(f(x))
        x += h
    return data
```

In [5]:
```
def simpson(data, h, n):
    sum = data[0] + data[n-1]
    for i in range(2, n):
        if i % 2 == 0:
            sum += 4 * data[i-1]
        else:
            sum += 2 * data[i-1]
    sum *= h / 3.0
    return sum
```

In [7]:
```
a = 0.0
b = 1.0
```

```
h = []
simp = []
rom = []
for i in range(1, 10):
    h.append(i*pow(10, -8))
for i in range(9):
    n = get_n(a, b, h[i])
    data = generate_data(a, b, h[i])
    simp.append(simpson(data, h[i], n))
    simp[i] -= -4/9
print(simp)
plt.plot(h, simp)
```

```
[4.794525332307842e-10, -1.756208511949353e-10, 1.2619005840264208e-10, -1.0813594464309517e-10,
```

Out[7]: [<matplotlib.lines.Line2D at 0x13224d278>]