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In [3]: #Melanie Daugherty, Samuel Lee, Ryan Somerfield  
#IE 300 Case Study 4  
import numpy as np  
import matplotlib.pyplot as plt  
import matplotlib.mlab as mlab  
import math
```

```
In [31]: def prem_one(R,n=100):  
    x = np.random.uniform(0,2*R,n)  
    sum = 0  
    for i in range(n):  
        sum=sum+max(x[i]-R,0)  
    sum = sum / n  
    print(sum)
```

```
In [32]: prem_one(3000000)  
  
615687.625697
```

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In [33]: prem_one(3500000)  
  
918276.367973
```

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In [34]: prem_one(4000000)  
  
1102238.97876
```

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In [35]: prem_one(5000000)  
  
1076809.58486
```

```
In [96]: prem_one(7500000)  
  
1623368.26591
```

```
In [56]: def gamma(x,k,n):  
    sum = 0  
    for j in range(1,96):  
        sum=sum+np.log(x[n-j])-np.log(x[n-k])  
    return sum
```

```
In [90]: def prem_three(R,n=100,k=96):  
        x = np.random.uniform(0,2*R,n)  
        total = 0  
        g = gamma(x,k,n)  
        total = 1/((1/g)-1)*R*(k/n)  
        total = total * np.power((R/x[n-k]),(-1/g))  
        return abs(total)
```

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In [91]: prem_three(3000000)
```

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Out[91]: 2825893.6395224715
```

```
In [92]: prem_three(3500000)
```

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Out[92]: 3571736.0206415243
```

```
In [93]: prem_three(4000000)
```

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Out[93]: 3757210.4153018622
```

```
In [94]: prem_three(5000000)
```

```
Out[94]: 4678764.9776153155
```

```
In [95]: prem_three(7500000)
```

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Out[95]: 7063213.7242657663
```

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In [ ]:
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