HW1

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```
#HW1
#1
import random
import math
import numpy as np
import pandas as pd

numNeedles=1000000
piGuess=0.0

def throwNeedles(numNeedles):
        inCircle = 0
        for Needles in range(1, numNeedles + 1) :
                x = random.uniform(0, 1)
                y = random.uniform(0, 1)
                if y - x*x <= 0:
                    inCircle+=1
        return inCircle/numNeedles
piGuess = throwNeedles(numNeedles)
print('y=x^2 area = ', piGuess)
```

```
y=x^2 area =  0.333487
```

```
#2
import random
import math
import numpy as np
import pandas as pd

numNeedles=1000000
piGuess=0.0

def throwNeedles(numNeedles):
        inCircle = 0
        for Needles in range(1, numNeedles + 1)
                x = random.uniform(0, 1)
                y = random.uniform(0, 1)
                z = random.uniform(0, 1)
                if x*x + y*y + z*z < 1:
                    inCircle+=1
        return inCircle/numNeedles
piGuess = throwNeedles(numNeedles)
print('1/8 ball\'s volumn = ', piGuess)
```

```
1/8 ball's volumn =  0.522783
```

```python
#3
import random
import pandas as pd
sd = 0.1
w2 = 2.0
w1 = 0.5
w0 = 0.3
num_sample = 30

df = pd.DataFrame(columns=['x', 'r'])
for i in range(0, num_sample):
    x = random.uniform(0, 1)
    r = w2*x*x + w1*x + w0 +random.gauss(0, sd)
    df = df.append({"x":round(x,3), "r":round(r,3)},ignore_index=True)
    print("x",round(x,3), "r",round(r,3))
df
df.to_csv('/content/drive/MyDrive/HW1_3.csv', index=False)
```

x	r
0.52	0.974
0.762	1.652
0.129	0.335
0.364	0.989
0.518	1.097
0.575	1.288
0.43	0.721
0.295	0.638
0.192	0.392
0.579	1.333
0.464	0.967
0.62	1.235
0.326	0.715
0.44	0.945
0.533	1.065
0.482	1.128
0.021	0.311
0.068	0.167
0.752	1.808
0.426	0.836
0.043	0.546
0.397	0.839
0.542	1.312
0.933	2.55