

```
import numpy as np
import random
from datascience import *
import matplotlib.pyplot as plt
from itertools import groupby
```

```
# Problem 1
n = 5
outcomes = 2
p = 1/outcomes

consecutive = p**n
print('P(5cT) =',consecutive)
```

P(5cT) = 0.03125

```
# Problem 2

results = ['heads','tails']

def simulator(num_tests):
    return [np.random.choice(results) for _ in range(num_tests)]

test5 = simulator(5)
print(test5)

num_tails = 0
for i in test5:
    if i == 'tails':
        num_tails+=1
print('Number of Tails: {}'.format(num_tails))
```

```
↳ ['heads', 'heads', 'tails', 'heads', 'tails']
   Number of Tails: 2
```

```
# Problem 3

def checkFor5Consecutive(test):
    counter=0
    for i in range(len(test)):
        if test[i] == 'tails':
            counter+=1
    return 1 if counter == 5 else 0

def repeatTrials(num_trials):
    num_all_tails = 0
    for _ in range(num_trials):
        num_all_tails += checkFor5Consecutive(simulator(5))
    return num_all_tails

print('Number of 5 consecutive Tails: {}'.format(repeatTrials(100)))
```

Number of 5 consecutive Tails: 6

```
# Problem 4

P5cT_10000 = repeatTrials(10000)

percentage = (P5cT_10000 / 10000) * 100
print('percentage,','%')
```

3.18 %

```
# Problem 5
```

```
num_tests_per_trial = 100  
num_trials2 = 10000
```

```
P5cT_in_num_trials = [repeatTrials(num_tests_per_trial) for _ in range(num_trials2)]  
print(P5cT_in_num_trials)
```

```
plt.hist(P5cT_in_num_trials, density=True, bins=20)  
plt.xlabel('Count of 5 consecutive tails')  
plt.ylabel('Percent per unit')  
plt.show()
```

