

BIS 420 PROGRAMMING FOR DATA SCIENCE

PRAJAKTA POHARE CHAPTER 10 EXERCISE 10.8 ILLINOIS STATE UNIVERSITY

The (so-called) Birthday Paradox:

1. Write a function called `has_duplicates` that takes a list and returns `True` if there is any element that appears more than once. It should not modify the original list.
2. If there are 23 students in your class, what are the chances that two of you have the same birthday? You can estimate this probability by generating random samples of 23 birthdays and checking for matches. Hint: you can generate random birthdays with the `randint` function in the `random` module.

You can read about this problem at http://en.wikipedia.org/wiki/Birthday_paradox , and you can download my solution from <http://thinkpython.com/code/birthday.py> .

#2

```
from __future__ import print_function, division
import random
```

```
def contains_duplicates(t):
```

```
    s = t[:]
    s.sort()
    for i in range(len(s)-1):
        if s[i] == s[i+1]:
            return True
    return False
```

```
def generate_random_birthdays(n):
```

```
    t = []
    for i in range(n):
        bday = random.randint(1, 365)
        t.append(bday)
    return t
```

```
def simulate_birthday_matches(num_students, num_simulations):
```

```
    count = 0
    for i in range(num_simulations):
        t = generate_random_birthdays(num_students)
        if contains_duplicates(t):
            count += 1
    return count
```

```
def main():
```

```
num_students = 23
num_simulations = 1000
count = simulate_birthday_matches(num_students, num_simulations)

print('After %d simulations' % num_simulations)
print('with %d students' % num_students)
print('there were %d simulations with at least one match' % count)

if __name__ == '__main__':
    main()

#1
print("*****1*****")
def has_duplicates(lst):
    return len(lst) != len(set(lst))

print(has_duplicates([1, 2, 3, 4, 5]))
print(has_duplicates([1, 2, 3, 4, 5, 1]))
```

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```
1 #2
2 from __future__ import print_function, division
3 import random
4
5 def contains_duplicates(t):
6     s = t[:]
7     s.sort()
8     for i in range(len(s)-1):
9         if s[i] == s[i+1]:
10             return True
11     return False
12
13 def generate_random_birthdays(n):
14     t = []
15     for i in range(n):
16         bday = random.randint(1, 365)
17         t.append(bday)
18     return t
19
20 def simulate_birthday_matches(num_students, num_simulations):
21     count = 0
22     for i in range(num_simulations):
23         t = generate_random_birthdays(num_students)
24         if contains_duplicates(t):
25             count += 1
26     return count
27
28 def main():
29     num_students = 23
30     num_simulations = 1000
31     count = simulate_birthday_matches(num_students, num_simulations)
32
33     print('After %d simulations' % num_simulations)
34     print('with %d students' % num_students)
35     print('there were %d simulations with at least one match' % count)
36
37 if __name__ == '__main__':
38     main()
39
40
41
42 #1
43 print("*****1*****")
44 def has_duplicates(lst):
45     return len(lst) != len(set(lst))
46
47
48 print(has_duplicates([1, 2, 3, 4, 5]))
49 print(has_duplicates([1, 2, 3, 4, 5, 1]))
```