

Python Programming

Programming Exercises 02

(Arrays)

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Dr. Ram P Rustagi
Professor, CSE Dept
KRP, KSGI
rprustagi@ksit.edu.in

Resources and Acknowledgements

- Intro to Programming in Python
 - Sedgewick, Wayne, Dondero (Princeton Univ)
- A first course in programming
 - <https://introcs.cs.princeton.edu/python/home/>
 - <https://introcs.cs.princeton.edu/java/home/>
- Python for everybody
 - <https://www.py4e.com>
- Web Applications for everybody
 - <https://www.wa4e.com>
- Turtle Graphics
 - <https://docs.python.org/3/library/turtle.html>
- <https://www.w3schools.com/python/>
 - Basic Python Tutorial

Probabilities of Playcard Deck

- Ex 01: Deck of Playing Cards
 - Create a deck of cards
 - Rank: 2, 3, 4, 5, 6, 7, 8, 9, 10, J, Q, K, A
 - Suite: Club, Diamond, Heart, Spade
 - Pick 2 random cards with replacing.
 - Find the probabilities of picking same suite card
 - By conducting 100000 trials
 - pick 4 random cards without replacing
 - Count the number of trials till you get the cards of same rank
- Note: to pick a random number between 1 and 10

```
import random
random.randrange(1, 11)
```

Avg Class size for Same Birthday

- Ex 02: Birthday Probability
 - Let students enter a class one by one.
 - The entry stops the moment the birthday of new incoming student is same as one of those already in the class.
 - Birthday can be taken as a number between 1 & 365
 - Conduct 10000 trials and find the average class size when two students have same birthday.
- Note: to pick a random number between 1 and 10

```
import random
random.randrange(1, 11)
```

Finding Duplicate Elements

- Ex 03: Finding a duplicate
 - Given an array of numbers
 - Elements of array have value less than array size
 - Find if a duplicate number exists
 - Do not create a new array
 - You can modify the elements of the array
 - Do not use a dictionary object
 - Do not check membership existence of element
 - e.g. do not use `if elem in arr:`
- Simple implementation in $O(n^2)$ time
- Can you find an efficient implementation: $O(n)$

Longest Plateau

- Ex 04: Finding Longest Plateau
 - Given an array of integers
 - Find the length and location of plateau i.e.
 - Longest contiguous sequence of equal values, where
 - values of elements just before and just after this sequence are smaller.

Questions

