Intro to Python

Exercise : Birthdays

Assignment

Lists

This exercise is designed to give you experience in using lists to store and manipulate data. These structures allow a program to store lists of information and to process all of the pieces of information in similar ways. Programs that use lists usually require less code than those that do not.

People with the Same Birthdays (same_birthday.py)

Whenever a group of people are gathered together, there is a chance that two or more people have the same birthday. It turns out that the chances of this occurring are higher than most people expect. You could used probability theory to calculate the exact probability, but instead you are going to create a program to calculate the approximate probability.

Programs like this one that simulate the real world using random number generators to calculate the probable outcome are called Monte Carlo programs (named after the area in France famous for its casinos full of games of chance).

For this program, a simple outline has been provided for you, and you need to fill in the missing details, then add more code to add features to the program.

Things You Should Know About Lists

- `x = []` # creates an empty list
- `x.append( 4 )` # adds an element to the end of the list
- `if x[0] == 5:` # checks of the first element of the list # has the value of 5
- `l = len(x)` # calculates the number of elements in the list
- `for i in range(len(x)):` # loops over the indexes of the list

Tasks:

- Fill in the code for createGroup() and countSameDays().
- Run the program for different numbers of groups and group sizes.
- How many groups are required to get the same result every time you run the program? For example, run the program several times with 10 groups, and 20 people in a group. Do you get the same result every time? What if you use 100 groups? What about 1000 or 10000 groups?
- How many people in a group before there is at least a 50% chance for there to be some people with the same birthday?
- What are the changes that there will be people with the same birthday if there are 30 people in the group?
- How much do the probabilities change if you add in leap days? How do you add in leap days?
- If you are in a school class of people born the same year as you, do you need to consider leap days?

Additional tasks:

- Change the program so that it calculates probabilities for all group sizes from 1 to 40, and print them in a nice table format.