

Randomness

The tasks this week are about using Python and numpy to simulate randomness and random processes.

In your work, try to use the functions, methods and data structures that Python provides wherever appropriate - try to make your code "Pythonic". Refer to your lecture notes for examples of the functions and methods you might need.

1. Write a Python program to generate 5 random integers from 1 to 10

Try this in three different ways:

- a) Use a for loop and just print out the numbers.
- b) Construct a list containing the numbers, and then print it out.
- c) Create the numbers all in one go as a numpy array, and then print it out.

[Remember to check the meaning and range of parameters to any functions you use.]

2. Write a Python program to simulate rolling a six-sided die

- a) Throw a six-sided die 10,000 times.
- b) Record how many times each numbered face comes up (1, 2, 3, 4, 5, and 6).
- c) Print the percentage occurrence for each outcome. How similar are they?

[Think about the most efficient ways to do this]

3. Write a Python program to simulate the National Lottery "Lotto" game

- a) Choose 6 numbers from 1 to 59 as your entry numbers (fixed or random)
- b) Draw 6 main numbers and one bonus ball number from 1 to 59
- c) Classify any prizes won:
 1. Match 6 main numbers: "Jackpot"
 2. Match 5 main numbers + the bonus ball: "Match 5+1"
 3. Match 5 main numbers: "Match 5"
 4. Match 4 main numbers: "Match 4"
 5. Match 3 main numbers: "Match 3"
 6. Match 2 main numbers: "Lucky Dip"
 7. Match 1 or 0 main numbers: *No prize*
- d) Run the simulation [repeat from **b**] for 104 draws, which is one whole year of twice-weekly play (costing £208)
- e) Print out the number of prizes won at each level. Did you get lucky?

[Hint: choice of datatype is key to simplifying code here. Not everything has to be a list or array!]