Random Excursion Test

The focus of this test is the number of cycles having exactly K visits in a cumulative sum random walk. The cumulative sum random walk is derived from partial sums after the (0,1) sequence is transferred to the appropriate (-1, +1) sequence. A cycle of a random walk consists of a sequence of steps of unit length taken at random that begin at and return to the origin. The purpose of this test is to determine if the number of visits to a particular state within a cycle deviates from what one would expect for a random sequence. This test is actually a series of eight tests (and conclusions), one test and conclusion for each of the states: -4, -3, -2, -1 and +1, +2, +3, +4.

this desctiption is taken from NIST documentation

- **INPUT**

  the program takes file with .pkl extension containg the sequence of bits (min. 10^6), the name of generator, Modulo and the amount of bits generated by PRNG being tested and loaded from '--input_file' (default for this moment is „binary_expansion_e.pkl")

- **USAGE**

  used libraries: *numpy, scipy.special, argparse, pickle, pandas*, *matplotlib.pyplot*

  ```
  python  z5_r_excursion_test.py
  ```

- **OUTPUT**

  program returns X^2 and p-value of every x state in [-4, -3, -2, -1, 1, 2, 3, 4]