Snakes and Ladders

Introduction

You and a friend are playing the classic board game of snakes and ladders. Both players begin on the start square and take turns rolling a standard 6-sided die. You move forward the number of places rolled on the die. If you land on a square that is at the very bottom of a ladder, you move to the top of the ladder. If you land on a snake head, you slide down to the bottom of the snake. The winner is the first player to the finish square, an exact roll is not required to finish.

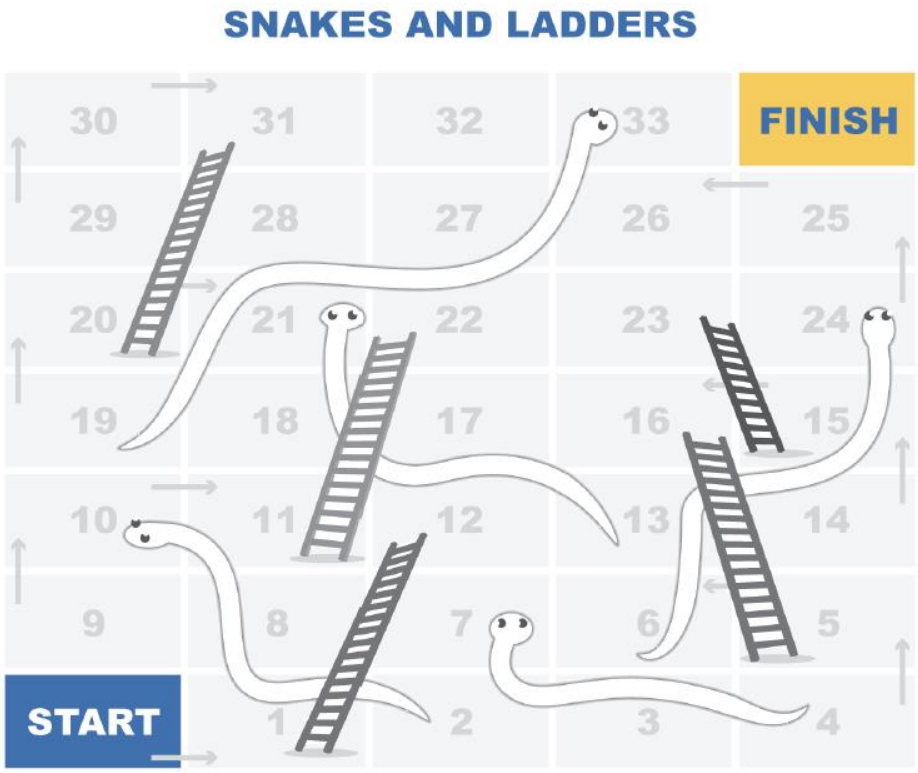
Being a keen Python user, you decide to simulate the game. Simulate 10 000 games of snakes and ladders, and then answer the following questions.

For the questions that follow:

- 'Player 1' refers to the player who moves first and 'Player 2' the player who moves second.
- You may wish to run your simulation several times to ensure your results are consistent.
- Your answers may not match exactly those provided, given the nature of simulation and the rounding of the provided answers. Select the closest answer.

THE BOARD

You use the following board to play the game.



For clarity, details of the board are as follows:

The ‘Start’ square is numbered 0, and the ‘Finish’ square is numbered 34.

The board contains the following ladders:

- 1 -> 12
- 5 -> 16
- 11 -> 22
- 15 -> 23
- 20 -> 31

The board contains the following snakes:

- 7 -> 4
- 10 -> 2
- 21 -> 13
- 24 -> 6
- 33 -> 19

Tips

To simulate a dice throw, use the following:

```
import random
d = random.randint(1, 6)
```

You can create multiple functions to answer the questions

QUESTIONS

Question 1

If you played the game by yourself, what is the average number of rolls required to finish?

a. 7 rolls

b. 9 rolls

c. 11 rolls

d. 13 rolls

Question 2

In a two person game, what is the average number of combined rolls by both players required for the game to finish?

a. 13 rolls

b. 15 rolls

c. 17 rolls

d. 19 rolls

Question 3

In a two person game, what is the probability that Player 1 wins?

a. 50 %

b. 53 %

c. 57 %

d. 60 %

Question 4

You decide you want the game to have approximately fair odds, and you do this by changing the square that Player 2 starts on. From the options below, which square for Player 2's start position gives the closest to equal odds for both players?

a. Square 3

b. Square 6

c. Square 9

d. Square 12