Classes Program Example

(Zylab 25.23)

Write a program to play an automated dice game (using the provided GVDie class). The player rolls both dice, and either wins one credit, loses one credit, or sets a goal for future rolls. The current round ends when player either loses or wins a credit. The game ends when the player reaches zero credits.

Step ϕ: Look at the provided class, GVDie, and the initial code template.

```
class GVDie :

    def __init__(self) :
        self.value = None

    def roll(self):
        self.value = random.randint(1,6)

    def get_value :
        return self.value

    def compare_to(self, d):
        return self.value == d.value
```

null pointer to an object.

so, an int !!

T/F Boolean

```
import random
import gv_die
```

(gv_die.py ↓ defines GVDie class)

```
seed = int(input())
```

random.seed(int(seed)) ; [defines the particular sequence of random #'s

Credits = int(input())

\# of lives

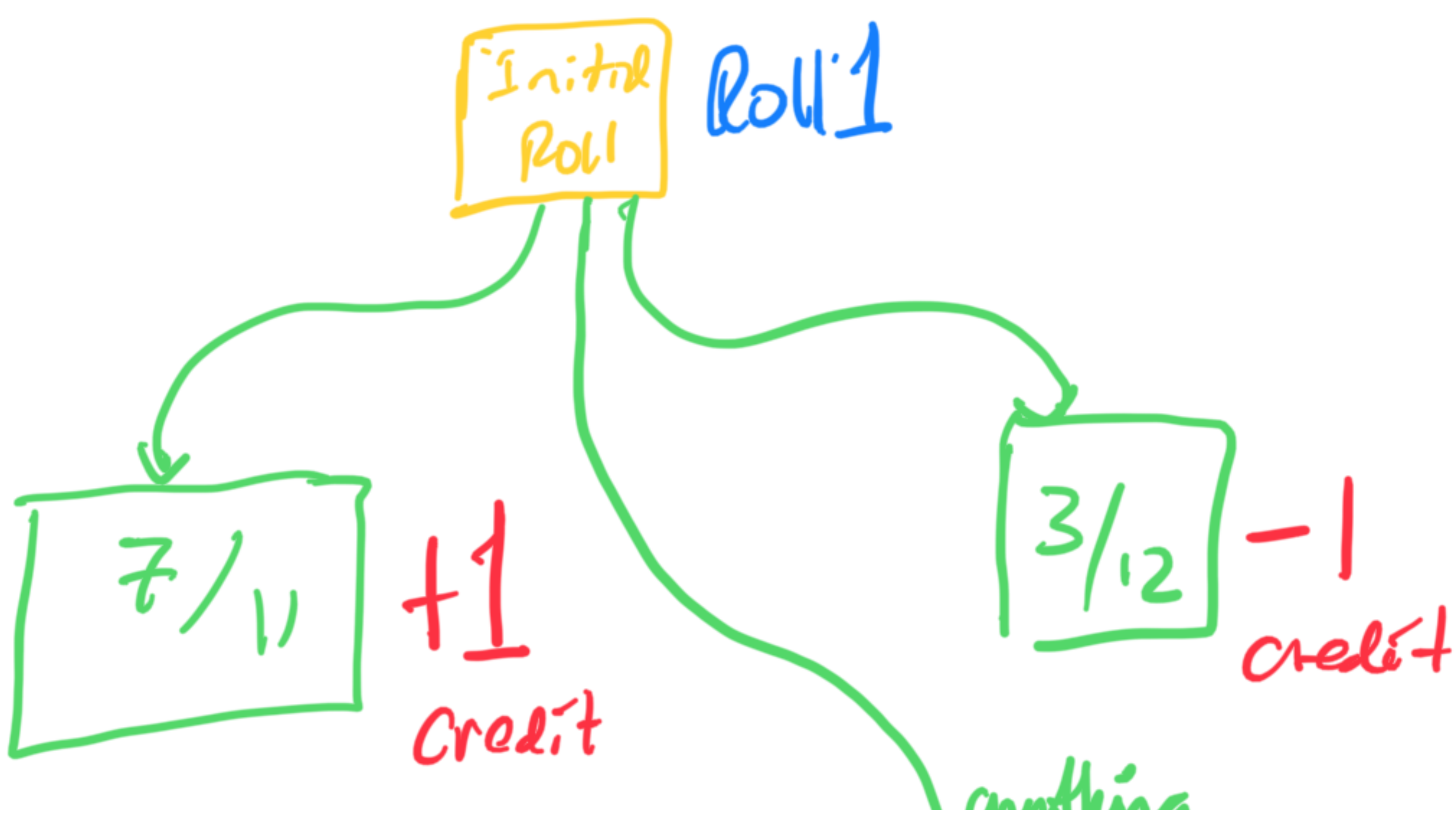
Step 1a:

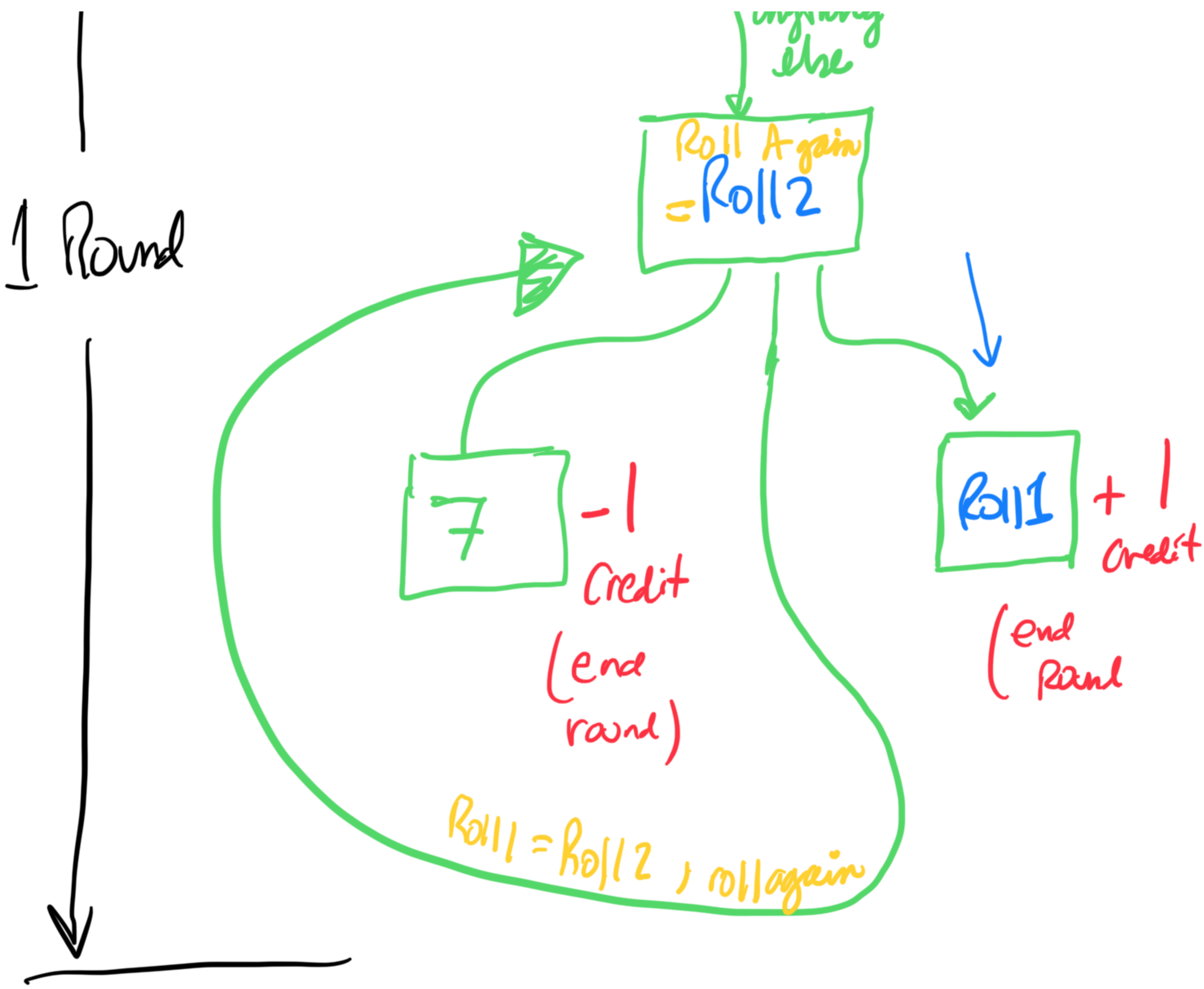
(i) create two GVDie objects

(ii) initialize rounds=0 & goal=-1

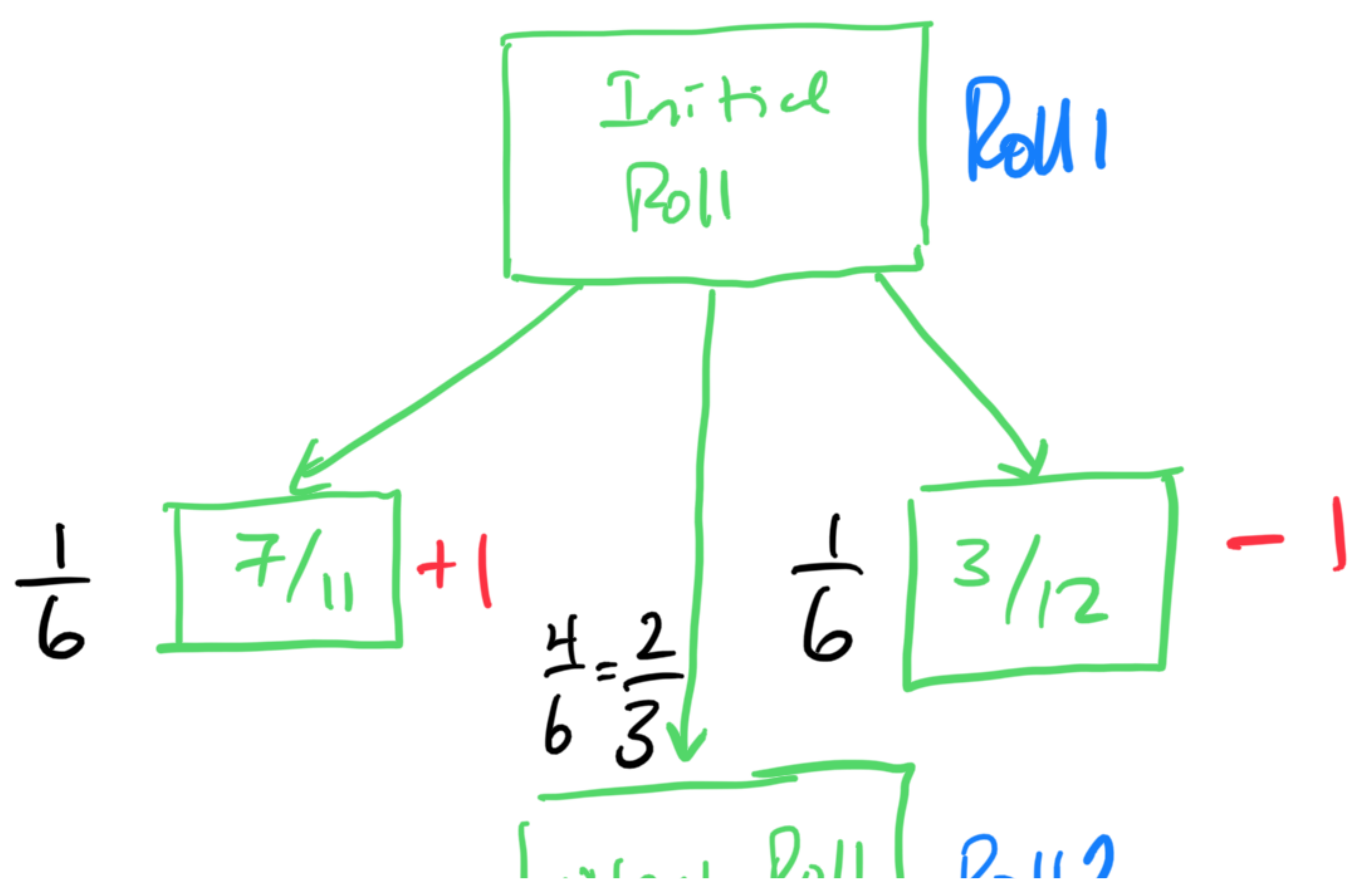
(iii) begin the main loop

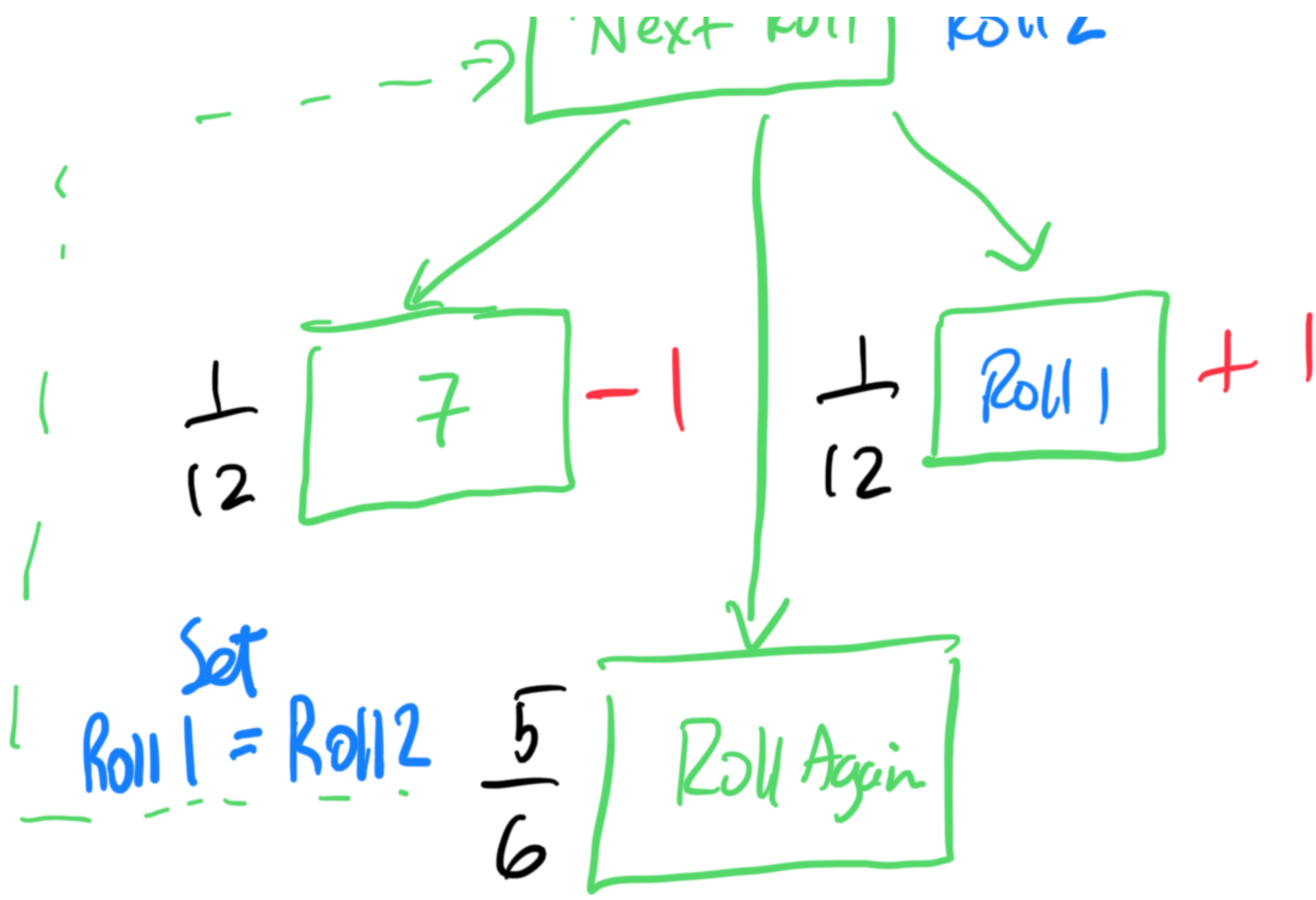
How does the game work?





What are the odds!?!?





Probability $(+1)$

$$= \frac{1}{6} + \frac{2}{3}\left(\frac{1}{12} + \frac{5}{6}\left(\frac{1}{12} +\right.\right.$$

$$+ \frac{5}{6}\left(\frac{1}{12} +\right.$$

$$+ \frac{5}{6}\left(\frac{1}{12} +\right.$$

$$\vdots$$

Probability (-1)

$$= \frac{1}{6} + \frac{2}{3}\left(\frac{1}{12} + \frac{5}{6}\left(\frac{1}{12} +\right.\right.$$

$$\frac{5}{6}\left(\frac{1}{12} + \right.$$

$$= \frac{1}{6} + \frac{1}{18} + \frac{2}{3}\left(\left(\frac{5}{6}\right)\left(\frac{1}{12}\right) + \left(\frac{5}{6}\right)^2\left(\frac{1}{12}\right) + \left(\frac{5}{6}\right)^3\left(\frac{1}{12}\right) + \cdots\right.$$

$$= \frac{1}{6} + \frac{1}{18} + \frac{2}{3}\cdot\frac{5}{6}\cdot\frac{1}{12}\underbrace{\left(1 + \frac{5}{6} + \left(\frac{5}{6}\right)^2 + \left(\frac{5}{6}\right)^3 + \left(\frac{5}{6}\right)^4 + \cdots\right.}_{5}$$

Sum of Geometric Series.

$$S_n = \frac{a_1(1-r^n)}{1-r}$$

$$\therefore \frac{5}{6} + \frac{5}{6}^2 + \frac{5}{6}^3 + \frac{5}{6}^4 + \cdots$$

$$S_\infty = \frac{5}{6}\left(1 - \cancel{\left(\frac{5}{6}\right)^{\infty}}^{\,0}\right) = 5$$

$$1 - 5/6$$

$$P = \frac{1}{6} + \frac{1}{18} + \frac{10}{18} \cdot \frac{1}{12} (6)$$

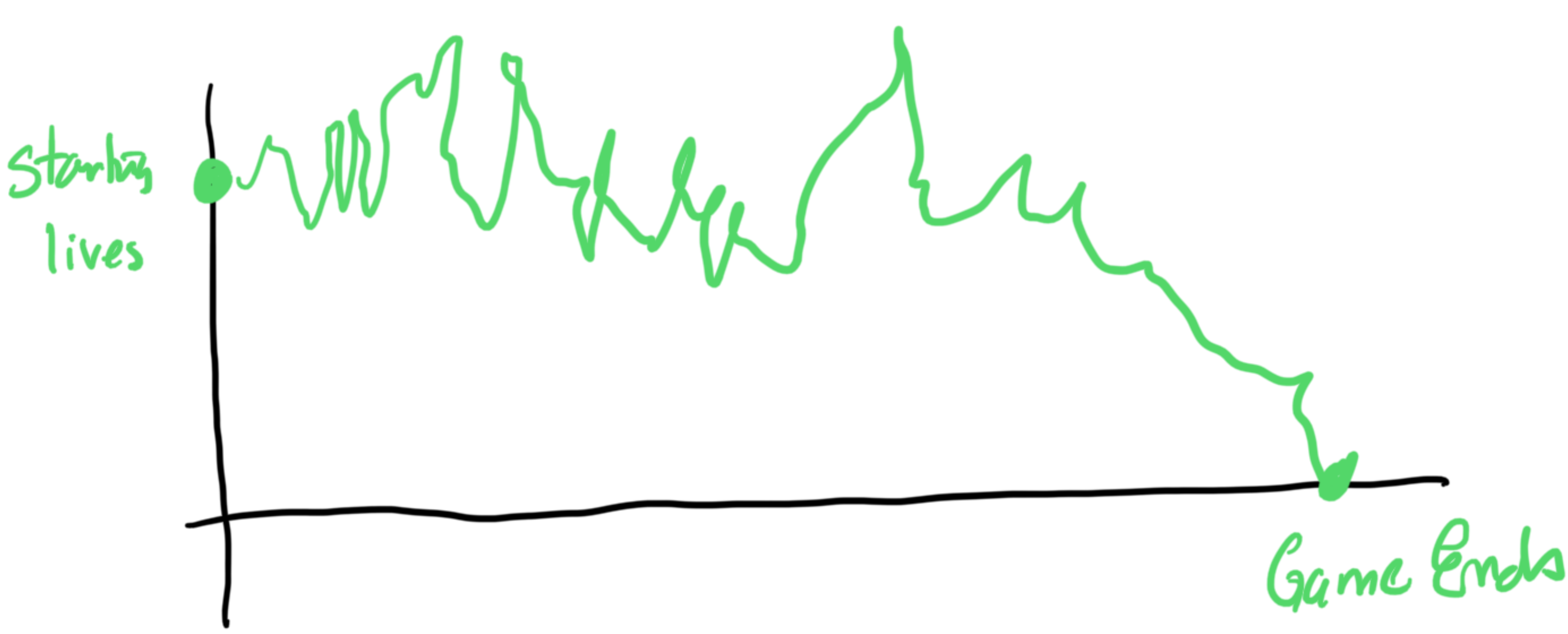
$$= 0.5 \;!!$$

Love it!

So, in this game

$$P(+1) = 0.5$$
$$P(-1) = 0.5$$

in any round.



This is known as a random walk problem, and is actually a fascinating one in modeling and simulation theory (take PHYS 441 (Python) to learn more.

See zylab_23*.py !!