

MCS 260 Project Three : a slot machine game due Monday 8 March at noon

The goal of this project is to apply functional top down design when writing Python scripts. We simulate the playing of a slot machine game.

The slot machines we consider have a varying number of reels, between 2 and 6. Every reel displays one decimal digit in $\{0, 1, \dots, 9\}$. At each turn, the slot machine spins numbers of length 2, 3, 4, 5, or 6 digits. For example, if the number of reels equals 4, then `random.randint(0,10**4-1)` returns the content of one spin. Numbers shown to the user are padded by zeroes from the left. For example, if the number of reels equals 4 and the random number generator returns 93, then 0093 is shown to the user.

The user of the program is first prompted to enter the number of reels. This number stays fixed during the whole duration of the game. At the start of the game, the player enters the number of tokens. Each spin costs the player one token. The game ends when the user chooses not to continue, or when the balance of tokens equals zero.

We denote the number of reels by r . The player hits the jackpot if the same digit occurs exactly as many times as r . We call the largest number of the same digits in one number the weight w . For example, the weight of 12121 is 3. Based on r and w , the player is awarded a number of tokens, defined in the table below:

awards	$w = 1$	$w = 2$	$w = 3$	$w = 4$	$w = 5$	$w = 6$
$r = 2$	0	10	—	—	—	—
$r = 3$	0	2	46	—	—	—
$r = 4$	0	1	8	253	—	—
$r = 5$	0	1	3	10	1000	—
$r = 6$	0	0	1	11	1002	18037

For example, in a 5-reel slot machine a spin of weight 4 gives 10 tokens as award.

At each spin, the player is shown the generated number, its weight, and the corresponding reward, all on the same line. In the next line, the program shows the player the accumulated balance of tokens, and asks if the player wants to continue the game.

If the Python script is in the file `slots.py`, then one session could go as follows:

```
$ python slots.py
welcome to our slot machine
-> how many reels (2, 3, 4, 5, or 6) ? 4
-> give the number of tokens : 10
spin 3719 has weight 1 with award 0
-> your current balance : 9, continue ? (y/n) y
spin 0603 has weight 2 with award 1
-> your current balance : 9, continue ? (y/n) n
ending balance : 9
```

As soon as the balance reaches zero, then the player is no longer asked whether to continue the game, as illustrated in the session below:

```
$ python slots.py
welcome to our slot machine
-> how many reels (2, 3, 4, 5, or 6) ? 5
-> give the number of tokens : 2
spin 87073 has weight 2 with award 1
-> your current balance : 2, continue ? (y/n) y
spin 97092 has weight 2 with award 1
-> your current balance : 2, continue ? (y/n) y
spin 97125 has weight 1 with award 0
-> your current balance : 1, continue ? (y/n) y
spin 85431 has weight 1 with award 0
ending balance : 0
```

Some important points:

1. Correct programs without use of functions will only receive half of the points.
2. Your top down design should be apparent in the structure of the program. For every function provide documentation, describing the type of all input parameters. Describe also what each function returns.
3. You may assume the input of the user is always correct.
4. Keep the same formats of the dialogue with the user as shown in the sample sessions. In particular: numbers shown must be padded with zeros, e.g. `print '%04d' % 4`.
5. Avoid spelling mistakes in the dialogue with the user.
6. The first line of your Python program must be
`# MCS 260 Project Three by <Author>`
where you replace the `<Author>` by your name.
7. Add documentation to clarify your choice of variables and to indicate the steps of the program.
8. Handing in an incomplete but working program is better than handing in a program that crashes or does not run at all.
9. The computer project must be solved *individually*. Collaborations are not allowed.
10. Email your solution to the project to `jan@math.uic.edu` before noon on Monday 8 March so the date of the email is proof of an on time submission. Bring also a printed version of your solution to class.

If you have questions or difficulties with the project, feel free to come to my office for help.