

Week 8 – Functions

1A2B (Bulls & Cows) Game Design/Development

We are about to develop a game called 1A2B (aka. *Bulls & Cows*) in Python. The game is played as follows:

1. In the beginning, the game will randomly pick four different digits as the target number (e.g., 2468) to be guessed by the player.
2. In each round of the game, the player must guess four digits, e.g., 1234. If a user-guessed digit occurs target number and its position is the same as that in the target number, it is considered as 1A (or 1 bull). If a user-guessed digit occurs in the target number, but its position is different from that in the target number, it is considered as 1B (or 1 cow).

For example, if the target number is 2468 and the user guess is 1234, the result of this round is 2B because both digits 2 and 4 occur in the target number but their positions are wrong. If the user guess is 2478, the result of this round is 3A because both digits 2, 4, and 8 occur in the target number, and their positions are all correct.

3. The player wins the game if their guess results in 4A (or 4 bulls), i.e., all the digits appear in the target number, and their positions are correct.

A screenshot of the game might look something like this:

```
Please input 4 digits: 1234
1 A (Bulls) 0 B (Cows)
Please input 4 digits: 5678
0 A (Bulls) 2 B (Cows)
Please input 4 digits: 7890
0 A (Bulls) 1 B (Cows)
Please input 4 digits: 1569
1 A (Bulls) 1 B (Cows)
Please input 4 digits: 0536
You Win!!
Attempts: 5
```

More information about the game: https://en.wikipedia.org/wiki/Bulls_and_Cows

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Discussion 1

To play the 1A2B game, what are the steps (procedures) needed? What is the flow of them? Come up with your design (algorithm) by pseudocode/flowchart first.

Discussion 2

Based on your design, define the prototype of functions corresponding to each step.

- What is the functionality?
- How many parameters? What are they?
- The return object of the function

Discussion 3

Implement each function according to your design.

Discussion 4

Combine all functions you developed to complete the game.