

Homework 5 — Game of Chance

Due October 16th, 2021 at 9pm

(52 points)

Objectives:

- Understand how to use while loops.
- Understand how to use conditionals inside of while loops.
- Understand how to use nested while loops. (A while loop inside of another while loop)
- Understand how to call functions so that you can reuse code.
- Understand how to use functions from modules.

Turn In:

- `hw5_lastname_code.ipynb`

You should turn this file in on moodle under the “Homework 5 - Game of Chance” link.

Instructions:

Your job is to write a program that:

1. Displays a menu to the user with an appropriate set of games
2. Asks them which game they want to play
3. Asks for information and allows them to play the game
4. Then, control flow goes back to the menu for game selection again

We have given you some starter code (`hw5_starter.ipynb`). This starter code has all the functions you will need defined and the general skeleton for your *main* function already written. You must:

- Replace the comments in *main* to appropriately assign variables so that the while loop only stops looping when the user chooses to exit in the menu.
- Fill in the code in the *display_menu* function so that it displays the menu as in the example below and then prompts the user for a choice, which it **returns**.
- Fill in the code for the three games (St. Petersburg lottery, First to a Word, and Game of 21) in the appropriate function we have defined for you. Below we will include a brief description of each game (instructions are also included in print statements in the starter code) and we will provide you with some tips.
- You may assume that the user will only enter valid input.

Bonuses (choose one of the following two, up to +3 points)

- 1) Implement a fourth game of your choosing. This bonus game must include a while loop. Bonus points will be assigned based on the complexity of the game included.
- 2) Implement functions that appropriately re-prompt the user for new input if they don't enter what you expect everywhere where you ask for user input. Make sure to do this by writing functions and calling the functions where appropriate (re-use your code!).



Game Description and Tips:

St. Petersburg Lottery- (10 points)

- (Description) You are being asked to implement a variation on a historically important game known as the St. Petersburg Lottery (read [this article](#) if you are curious about the original game). In the version you are implementing in this assignment, the player will select any number greater than 0. Up to the number of times they chose, a “virtual coin” will be flipped that randomly chooses 0 or 1. If a 1 comes up before the last flip, then they lose. If a 1 does not appear at all in the given drawing, then the user loses. They only win if 1 is chosen for the first time exactly on the last flip.
- (Coding Tips) You should use a while loop to “flip the coin” up to the number of times the user specifies. You should use the `random.randint(0,1)` function to randomly choose 0 or 1. Set the logical expression in the loop in such a way that it stops when either a 1 appears or they have flipped the user specified number of times. From this you will be able to know whether they have lost the game.

First to a Word- (12 points)

- (Description) You are being asked to implement a two player game. In this game players will take turns choosing letters one at a time until a word is formed. After each letter is chosen users will have a chance to decide whether or not a word has been formed. When a word is formed, the player who played the last letter wins. Only words of length greater than 2 should be allowed to be stopped on. The starting player is chosen at random.
- (Coding Tips) You should use a while loop that only stops looping when the players agree that a word has been chosen. Associate each player with a number and use `random.randint(0,1)` to randomly choose a player that starts.

Game of 21- (10 points)

- (Description) You are being asked to implement the game you played during the first lab. In this game two players alternate choosing numbers. Starting from 1, the players take turns saying a number that is 1, 2, or 3 greater than the previous number. The first player always starts by saying “1”. The player who says “21” loses. You may not say a number greater than 21. The starting player is chosen at random.
- (Coding Tips) You should use a while loop that only stops when the total number in the game is greater than or equal to 21. You should only ask players to choose numbers that increase the total by 1, 2, or 3 and should not allow them to ever directly affect the total. Associate each player with a number and use `random.randint(0,1)` to randomly choose a player that starts.

Remaining 20 points:

- 5 points for appropriately updating the code for `main()` that we have provided
- 5 points for implementing the `display_menu` function
- 10 points for style and comments (see notes at end of write up)



Output & Testing:

It is your responsibility to test your program. Try all the “edge cases”. That is, try your best to break your own code within the parameters (e.g. create infinite loops, try all the different types of behaviours. *Make sure your output exactly matches ours!* Above you have an example of all three games, of all options being selected, etc.

Development:

Your code should always be in a “runnable” state. **Do not attempt to develop your entire program without running it.**

- 1) Start setting up the main function. You'll need to write code to make this work. Run your program. Without filling any of the functions out, main should immediately act as if the user chose to exit.
- 2) Next, write the function that prints out the menu and asks for a user's choice. Look at how the function is being called in *main*, should the *display_menu* function be returning anything or just printing? Test it.
- 3) Next, write the function for each game. As you work on a game, test it by running the main function and choosing it from the menu. Ensure it is working as you expect and looks as you want! Do test your game as you are implementing it. (For example, first write the code to get the number from a user and flip a coin that many times. Test it. Then work on figuring out if the user won or not.)
- 4) Finally, test your code with a variety of user input. Ensure that the menu keeps being displayed after each game played until the user chooses to exit.

Example output:

Below is example output of the program. User input is shown in **bold**. Your program should **exactly reproduce** the output shown below.

Example output (user input in **bold**, more example output files provided separately)

```
Welcome to the Game of Chance!

~=[Menu]=~
1 - St. Petersburg Lottery
2 - First to a Word
3 - The game of 21
4 - Exit the Game of Chance

Which menu option do you choose? 1

##### St. Petersburg Lottery #####
Instructions:
You will select any number greater than 0.
Up to the number of times you chose, we will randomly choose 0 or 1.
If a 1 is chosen before the last drawing, then you lose.
If a 1 does not appear at all, then you lose.
You win if 1 is chosen for the first time exactly on the last drawing.
```



Enter player's name: Gabe

How many times do you think we will need to draw numbers before a 1 appears? 4

Womp womp! You lose!
Better luck next time!

~=[Menu]=~

- 1 - St. Petersburg Lottery
- 2 - First to a Word
- 3 - The game of 21
- 4 - Exit the Game of Chance

Which menu option do you choose? 1

St. Petersburg Lottery

Instructions:

You will select any number greater than 0.
Up to the number of times you chose, we will randomly choose 0 or 1.
If a 1 is chosen before the last drawing, then you lose.
If a 1 does not appear at all, then you lose.
You win if 1 is chosen for the first time exactly on the last drawing.

Enter player's name: Gabe

How many times do you think we will need to draw numbers before a 1 appears? 30

Womp womp! You lose!
Better luck next time!

Welcome to the Game of Chance!

~=[Menu]=~

- 1 - St. Petersburg Lottery
- 2 - First to a Word
- 3 - The game of 21
- 4 - Exit the Game of Chance

Which menu option do you choose? 2

First to a Word

Instructions:

You will take turns choosing letters one at a time until a word is formed.
After each letter is chosen you will have a chance to confirm whether or not a word has been formed
When a word is formed, the player who played the last letter wins!



One of you has been chosen at random to initiate the game.

Note: Words must be longer than a single letter!

Enter player 1's name: Theo (Gabe's Cat)

Enter player 2's name: Tommy (Gabe's Fuzzier Cat)

Theo (Gabe's Cat): Please enter a character. N

You currently have put together the letters: N

Tommy (Gabe's Fuzzier Cat): Please enter a character. I

You currently have put together the letters: NI

Theo (Gabe's Cat): Please enter a character. P

You currently have put together the letters: NIP

Is this a word? (yes or no) yes

Congratulations Theo (Gabe's Cat), you win!

~=[Menu]=~

- 1 - St. Petersburg Lottery
- 2 - First to a Word
- 3 - The game of 21
- 4 - Exit the Game of Chance

Which menu option do you choose? 4

Welcome to the Game of Chance!

~=[Menu]=~

- 1 - St. Petersburg Lottery
- 2 - First to a Word
- 3 - The game of 21
- 4 - Exit the Game of Chance

Which menu option do you choose? 3

Game of 21

Instructions:

Starting from 1, you will take turns saying a number that is 1, 2, or 3 greater than the previous number.

The first player always starts by saying 1.

The player who says 21 loses.

You may not say a number greater than 21.

One of you has been chosen at random to initiate the game.



Enter player 1's name: Theo
Enter player 2's name: Tommy

The current number is: 1

Tommy: Do you want to increase the current number by 1, 2, or 3? 3

The current number is: 4

Theo: Do you want to increase the current number by 1, 2, or 3? 3

The current number is: 7

Tommy: Do you want to increase the current number by 1, 2, or 3? 2

The current number is: 9

Theo: Do you want to increase the current number by 1, 2, or 3? 1

The current number is: 10

Tommy: Do you want to increase the current number by 1, 2, or 3? 2

The current number is: 12

Theo: Do you want to increase the current number by 1, 2, or 3? 3

The current number is: 15

Tommy: Do you want to increase the current number by 1, 2, or 3? 1

The current number is: 16

Theo: Do you want to increase the current number by 1, 2, or 3? 2

The current number is: 18

Tommy: Do you want to increase the current number by 1, 2, or 3? 2

The current number is: 20

Theo: Do you want to increase the current number by 1, 2, or 3? 1

Congratulations Tommy, you win!

~=[Menu]=~

- 1 - St. Petersburg Lottery
- 2 - First to a Word
- 3 - The game of 21
- 4 - Exit the Game of Chance

Which menu option do you choose? 4

We will now exit the Game of Chance.
Thank you for playing!



Comments (5 points)

Your code must be commented! You must include a file comment (your name, your section, the homework name, and a brief description of what the program does), inline comments (explaining any complex code), and function comments. An example function comment is shown below:

```
def fahrenheit_to_celsius(fahrenheit):  
    """  
        This function converts a temperature in fahrenheit to celsius  
        and prints the equivalence.  
        Parameters:  
            fahrenheit (int or float): degrees fahrenheit  
        Return:  
            celsius (float): equivalent degrees celsius  
    """  
    celsius = (fahrenheit - 32) * (5/9)  
    return celsius
```

Style & Structure (5 points)

Naming (1 point)

- Your variable names should be meaningful and concise
- Your variable names should be formatted like: `user_birthday` (words start with lowercase letters and are separated with underscores)
- Function names should be formatted the same way as your variables: `get_today()` (words start with lowercase letters and are separated with underscores)

Proper Variable Usage (1 point)

- You should not have variables outside of functions.

Functions (3 points)

- You **must** have a `main` function. The only code in your program that is not inside a function should be a single call to `main()`.
- All non-main functions **must** be defined at the zero indentation level, as in the example lecture code. Do not attempt to define a function inside another function.
- Do not define multiple main functions.

