

Python Programming #3C

The TLCW / TLCL Nim Game

Writing a computer program that can play both the TLCW nim game and the TLCL nim game like an ordinary person

Overview: You should enhance your program for **Python Programming #3B** for the TLCW (**T**aking the **L**ast **C**oin to **W**in) nim game further so that the program can **(i)** play either the TLCW nim game or TLCL (**T**aking the **L**ast **C**oin to **L**ose) nim game with the user, **(ii)** have either the user or the computer start the game, **(iii)** check to make sure the user cannot make an invalid move, **(iv)** make the right move to win the game if in one move the computer program can win the game, and **(v)** correctly announce the final winner of the game in the end.

The TLCW / TLCL Nim Game

- Before the game starts, the players negotiate to determine **(i)** whether taking the last coin means winning the game or losing the game, **(ii)** who should start the game, **(iii)** n , the number of coins to begin with, and **(iv)** m , the maximum number of coins a player can take on each turn where m is less than n and is at least 1.
- The players then take turn to take at least one coin but no more than m coins each time until there is no coin left.
- Announce the winner of the game.

About enhancements to make:

1. **Playing either the TLCW nim game or TLCL nim game with the**

user:

- a. In addition to asking the number of coins in the beginning and the maximum number of coins allowed to take each time, add additional Python statements there to ask the user to enter either *L* or *W* to indicate whether taking the last coin means winning the game or losing the game before the game starts, and then store either "L" or "W" in a variable *GameOption*.

2. Having either the user or the computer start the game:

- a. Similar to step 1 above, add additional Python statements there to ask the user to enter either *C* or *U* to indicate the computer or the user should make the first move to start the game, and then store either "C" or "U" in the variable *currentTurn*, which has been used in Python Programming 3B to indicate whose turn it is at the moment.

3. Check to make sure the user cannot make an invalid move:

- a. Instead of always accepting what the user says about the number of coins to take, add a *while* loop that will repeat itself as long as either (i) the number of coins to take is greater than the maximum allowed, or (ii) the number of coins to take is greater than the number of coins still left, or (iii) the number of coins to take is less than 1.
- b. In the loop, you will print a message telling the user it is an invalid move and then ask the user to enter a different number again.

4. Make the right move to win the game if in one move the computer

program can win the game:

- a. For **TLCW**: take all the remaining coins if the number of coins left now is less than or equal to the maximum allowed.**
- b. For **TLCL**: take coins to leave only 1 coin if the number of coins left now is less than or equal to 1 plus the maximum allowed.**

5. Correctly announce the final winner of the game in the end:

- a. In the end of your program, announce the winner of the game using an *if/else* statement(s) based on (i) who made the last move to end the game and (ii) whether the contents of *GameOption* is "L" or "W".**