CS5001-5003, Homework 1, Fall 2022

There are three questions. Use a separate file for each part.

1. [33 points] Create a file called, **hw1_1_bd_flow.*xxx***, where the extension (***xxx***) is one of .**jpg**, .**jpeg**, .**png**, .**gif**, or .**pdf**. You can create this file by drawing a flowchart on a piece of paper, if neatly done, and then just taking a picture of it with your phone. Or, if you prefer, you may use a free online tool such as LucidChart and export your work to one of the desired formats. Whether or not you use a software tool, please limit yourself to the basics: ovals for start/stop, rectangles for processing steps, parallelograms for input/output, diamonds for decisions, and arrows to show the flow of control.

Create a flowchart that describes the following steps:

- Create a variable named, **current_year**, with the integer value 2021.
- Print "Welcome! What is your name? "
- On the same line, read the name of the user and store it into a variable called, **user_name**.
- Print "Hi, " followed by the user's name, on the same line, followed by a period.
- Prompt the user with "How old are you? " and input their response (a string of digits).
- Convert their response to an integer and store it in a variable called, **user_age**.
- Calculate the user's year of birth and save it in a variable called, **user_birth**.
- Print "You were born in ", followed by the user's year of birth, followed by a period, all on the same line.

(Don't worry about possibly being off-by-one, due to the month of birth, for now!)

2. [34 points] Create a file called, **hw1_2_bd_code.py**, using the IDLE editor and starting from a copy of our basic template for a Python program (template.py). Implement the algorithm you flowcharted above using Python 3.9. Here are a few hints and reminders about built-in functions you may find helpful, and worth playing with:

- input(prompt): *prints prompt(a string), and then reads and returns whatever string is typed by the user*
- int(string1) converts string1 to a corresponding integer, if this makes sense
- print(arg1, arg2, ...) *prints arg1, then arg2, and so on, each followed by a space.*
- print(arg1, arg2, ..., sep='') is similar, but leaves out the space separator. Those are two single-quotes, by the way!

3. [33 points] Create a file called, **hw1_3_ guess_flow.*xxx***, where ***xxx*** is as above. In this file, draw a flowchart to solve the following problem. Try to design an ***algorithm*** that enables the computer to always win the game. Use the same guidance and conventions described in problem 1.

- Create a flowchart for a program that plays, "Guess My Number" with the user. The human user secretly picks a number between 1 and 100 and writes it on a piece of paper. The computer must try to guess it. The human user must answer each guess, truthfully, with one of 3 answers:
    - yes (if the computer's guess is correct) – Computer Wins!
    - low (if the guess is too low)
    - high (if the guess is too high)
- One simple approach might be to ask, "is it 1?", "is it 2?" and so on. However, if the user had chosen 100 as their number, this approach would take 100 guesses! (On the average, if the user choses randomly, this approach would take about 50 tries.)
- **And, there is one more rule:**
    - ***The computer is limited to 7 guesses.***
- After 7 guesses -- unless the final guess was correct -- the game is over and the computer has ***lost!*** Try to devise a *winning algorithm* for the computer.

Standard Instructions for CS5001-5003 Assignments (Boilerplate):

1. Except for assignments or parts of assignments where Gradescope submission has been specified, please submit your solution, including any supporting files, using Canvas. Navigate to the *Assignments* page, click o*n Start Assignment*, and then click on *File Upload*. (For some problems, *Text Entry* may suffice.) Please be careful to name your files exactly as specified in the assignment. You may submit multiple times prior to the deadline. However, be careful not to overwrite any needed files from previous, partial submissions. One good strategy is to do all the work for the entire assignment in a single folder, compress it to a ".zip" file, and upload that. Then you can confidently replace it with a newer version, if needed.

2. Standard *Academic Integrity* guidance: For Homework Assignments – unlike Lab Assignments -- please do not collaborate with other students, beyond posting generalized questions and answers on Piazza. When in doubt, you can post your question "Only to Instructors" – but please indicate if it is OK for us to share your question and our answer with the whole group. Also, if you rely on sources on the web or resources other than those assigned, please be sure to cite those sources. You will usually learn more if you solve each problem on your own. Python's built-in documentation features can be very helpful.