CSCA20 Fall 2024 Final Exam
Duration — 2 hours and 45 minutes
Aids allowed: Open Book, 1 Electronic device running Wing 101, NO INTERNET CONNECTION

Read and follow all instructions on this page, and fill in all fields appropriately. Do **not** turn this page until you have received the signal to start. If you use any space for rough work, indicate clearly what you want marked. Write as clearly and legibly as possible. No marks will be awarded to unreadable answers.

Skills Demonstrated

	User I/O	Loops	Selection	Loops + Selection	Strings/Lists	Functions	Testing	Documentation (internal)	Documentation (external)	File I/O	Dictionaries	External Tools
Q1												
Q2												
Q3												
Q4												
Total												

Total Pages = 14

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Rubric for Demonstrating Skills:

Q1

- Loops: Correctly loop over indices the lists, stopping the loop when an error is found
- Loops + Selection: Correctly identifying books which have copies checked out vs books with no copies checked out, vs errors
- Lists: Access the corresponding values for titles, and generate the resulting list
- Functions: A correctly working function
- Testing: Examples testing proper for good input, bad input, and at least one boundary condition
- External Documentation: properly formatted documentation that explains function well enough to be used by someone who has never read the question

Q2:

- User I/O: prompt user and respond to user input sensibly, including meaningful warning messages
- Selection: Deal with correct & incorrect user inputs
- Internal Documentation: helpful comments explaining algorithm
- File I/O: Open, close, and properly read files
- Dictionaries: Add to dictionaries, check for existing membership
- External Tools: Correctly use csv DictReader to process csv files

Q3:

- File I/O: Open, close, and properly read & strip files
- Internal Documentation: helpful comments explaining algorithm
- Dictionaries: Correctly reads dictinoaries, correctly creates new dictionary

Q4:

- External Tools: correctly uses matplotlib to create graph

NOTE: You can get marks for skills even if you cannot complete all skills in a question, simply add a comment explaining the part you don't know how to complete (e.g., `#open the file here` or `#check if x already exists as a key in the dictionary`)

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Question 1.

Completion of this question demonstrates the skills of: Loops, Loops + Selection, Lists, Functions, Testing, External Documentation

In the space below, write a function that takes in three lists, one list containing the titles of books, a second list containing the number of times that a copy of the corresponding book has been taken out from the library, and a third list containing the number of times that a copy of the corresponding book has been returned to the library. Your function should return a list of titles of books which currently have at least one copy checked out (i.e., where the number of times taken out is greater than the number of times returned). If your function encounters a book where more copies have been returned than were taken out, it should stop immediately, without reading any more book titles, and return the string "ERROR" instead of returning a list

```
---USER CSV FORMAT---
user id,name,address
user01,Holly Jolly,"123 North Pole Ln, Festive Town"
user02,Nick Claus,"456 Reindeer Rd, Christmas City"
user03,Carol Singer,"789 Mistletoe Ave, Yuletide Village"
user04,Ivy Garland,"101 Elf St, Merryville"
user05,Chris Tmas,"202 Snowflake Blvd, Frosty Hollow"
user06,Merry Berry,"303 Candy Cane Ln, Sugarplum Hills"
user07,Noe Ell,"404 Snowman Dr, Blizzard Bay"
user08,Jack Frost,"505 Sleighbell Ct, Hollyhock Hamlet"
user09,Rudy Red,"606 Chimney Top, Jinglewood"
user10,Eve Star,"707 North Star Rd, Bethlehem Park"

---BOOKS CSV FORMAT
book id,title,author,publication date
book01,Santa's Secret Diary,Kris Kringle,2010-11-01
book02,Reindeer Games Gone Wrong,Roo D. Olph,2015-12-15
book03,Elves Behaving Badly,Jingle Bellows,2018-10-23
book04,The Naughty List Chronicles,Coal Mine,2020-11-25
book05,Frosty's Meltdown,Chill E. Snowman,2013-12-05
book06,A Very Merry Mishap,Ivy Evergreen,2017-12-01
book07,Yule Log Jokes,Holly Wood,2016-11-20
book08,The Gift Wrapping Disaster,Tince Ell,2019-12-10
book09,Mistletoe Mayhem,Kiss M. Quick,2021-12-12
book10,Deck the Halls with Laughter,Merry N. Bright,2022-12-01
```

Question 2.

Completion of this question demonstrates the skills of: User I/O, Selection, File I/O, Dictionaries, External Tools

In the space below, write a program that lets the user add new books or users to a library. The user should be able to either enter the name of a user csv file, add the name of a books csv file, add an individual user, or add an individual book. The csv files should be formatted as shown on the opposite page, and the individual books/users should prompt for the same info as the csv files.

Your code should produce two dictionaries: one mapping book ids to book titles, and another mapping user ids to user names. You may assume the user will only ever enter valid file names, and that the files will be properly formatted. But if the user provides bad menu input, or if the user or file tries to create book or user with an id that already exists, your program should provide a warning message.

```
user id,book id,transaction
user04,book08,checkout
user07,book01,checkout
user03,book05,inquire
user06,book04,checkout
user01,book06,checkout
user07,book09,checkout
user09,book02,inquire
user04,book02,checkout
user07,book05,checkout
user01,book02,checkout
user08,book06,inquire
user04,book08,checkout
```

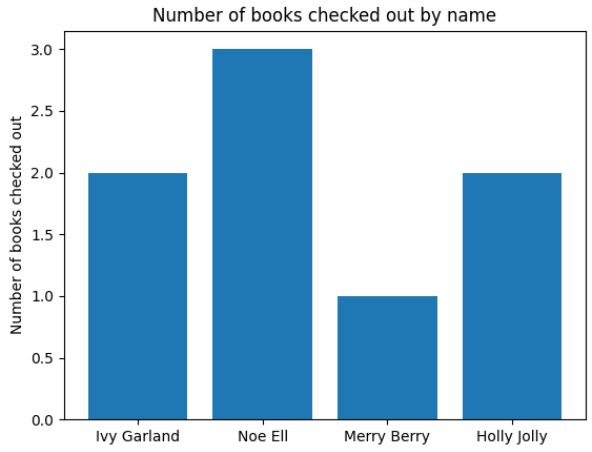
Question 3.

Completion of this question demonstrates the skills of: File I/O, Internal Documentation, Dictionaries

In the space below, write a program that and asks the user for the name of a checkout file (formatted as on the opposite page). The program should then produce a dictionary mapping user names to the set of books that user has checked out. You may assume that your program has access to properly created dictionaries from Question 2, even if you could not complete the question. You can also assume that the input file is correctly formatted, and only contains valid user ids and book ids.

```
---EXAMPLE INPUT DICTIONARY
{
 'Ivy Garland': {'The Gift Wrapping Disaster', 'Reindeer Games Gone Wrong'},
 'Noe Ell': {"Frosty's Meltdown", "Santa's Secret Diary", 'Mistletoe Mayhem'},
 'Merry Berry': {'The Naughty List Chronicles'},
 'Holly Jolly': {'A Very Merry Mishap', 'Reindeer Games Gone Wrong'}
}
```

---EXAMPLE OUTPUT GRAPH



Question 4.

Completion of this question demonstrates the skills of: External Tools

In the space below, write a program that uses a dictionary as produced in the previous question, mapping user names to the set of books they have taken out, and creates a graph showing the number of books taken out by each user. An example graph is shown on the previous page.

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End of Test