**Instructions – Final Exam Practice 1**

**Overview:** A local library wants to test out a very simple prototype program for importing and processing a sample of their data about library patrons and books. You are given two excel files, one with data about patrons, the other with data about books. Patrons can check out up to 3 books at a time, and a book that is checked out can’t be checked out by anyone else. The program should be able to have patrons check out books and display the books each patron has checked out. You’ll need to import the data into python, create classes for patrons and books, and display some information about them.

Remember that partial credit is given. Do as much as you can.

**Libraries Required:**

* import random
* choose one:
  + import pandas as pd
  + import openpyxl

**External Files Required:**

* patrons\_data.xlsx (download from learning suite)
  + includes patron\_id and name
* books\_data.xlsx (download from learning suite)
  + includes title, author, and genre

**Classes Required:**

* Book
  + Instance variables:
    - Title, author, genre, is\_checked\_out (should default to False)
  + Methods:
    - \_\_init\_\_ (the constructor)
    - display\_info
      * prints out “title by author (Genre: genre)”
* Patron
  + Instance variables:
    - patron\_id, name, checked\_out\_books
  + Methods:
    - \_\_init\_\_ (the constructor)
    - check\_out\_book
      * Accepts a Book object as a parameter. Will add the Book object to the Patron’s check\_out\_books and mark the book as checked out as long as the Book is not already checked out and the patron doesn’t have more than 3 books checked out already.
    - display\_checked\_out\_books
      * Runs the Book method display\_info() for all the books the Patron has checked out. Otherwise says the user has no books checked out.

**Logical Flow:**

There are many ways to do this. All that matters is that your code implements the requirements. The exact order, what libraries you use, the specific code, etc. can all vary. The only exception would be doing something in a very, very obviously inferior way (such as hard coding/manually typing in all the information from the files instead of importing it using pandas/openpyxl, etc.)

1. Import the books\_data.xslx file (you can use relative or absolute paths), and have each row in the file become a Book object
   1. Every column in the excel file represents what should become an instance variable for the book object, except for is\_checked\_out, which isn’t in the excel file. Is\_checked\_out should default to False.
   2. Every book should be stored in a list.
2. Import the patrons\_data.xlsx file (you can use relative or absolute paths), and have each row in the file become a Patron object.
   1. Every column in the excel file represents what should become an instance variable for the Patron objects, except checked\_out\_books, which isn’t in the excel file. Checked\_out\_books should default to an empty list.
   2. Every Patron should be stored in a list.
3. For every patron, randomly choose a number between 1 and 4 (inclusive) and try to check out that number of random books using the Patron method check\_out\_book.
   1. Before a Patron runs check\_out\_book 1-4 times, print out:
      1. “Name will try and check out number book(s):”
         1. For example: “James Smith will try and check out 2 book(s):”
   2. Then, 1-4 times, randomly choose a Book object and run check\_out\_book with that Book object passed as a parameter. Check\_out\_book should do the following:
      1. Check two conditions:
         1. Check that the book they are trying to check out is not already checked out (the Book’s is\_checked\_out variable should be False if it is available, and True if it is checked out)
         2. Check that the Patron’s checked\_out\_books list has less than 3 books in it.
      2. If both of the conditions are true, then you should:
         1. mark the book as being checked out (set the Book’s is\_checked\_out to True)
         2. add the Book object to the Patron’s checked\_out\_books list.
         3. Print out “book title has been checked out by patron name.”
      3. If one or both of the conditions are NOT true, then you should print out:
         1. “Cannot check out book title. Limit reached or book already checked out.”
   3. Note that sometimes patrons will try to check out a book and can’t (such as when they try and check out 4 books, or when they try to check out a book that has already been checked out.) Some patrons might end up with no books. This is an intended possibility.
   4. Feel free to add some spacing between the patrons text that you print out. This is optional, but might make it easier to see what is going on.
4. After all patrons have attempted to check out their 1-4 books, run the display\_checked\_out\_books method on all the patrons. Display\_checked\_out\_books does the following:
   1. If there is at least one book in the patron’s checked\_out\_books list,
      1. Print “Patron name has checked out the following books”
      2. Then run the display\_info Book method on every book in their list.
         1. Display\_info is a method in the Book class that just prints:
            1. “Book title by author (Genre: genre)”
   2. If the Patron has no books in their checked\_out\_books list:
      1. Print “patron name has no books checked out.”

Upload just the python file to Learning Suite.

**Example Output:**

Note: since which and the number of Books are randomly assigned, outputs will vary greatly.

James Smith will try and check out 1 book(s):

Ulysses has been checked out by James Smith.

Maria Garcia will try and check out 3 book(s):

The Brothers Karamazov has been checked out by Maria Garcia.

Wuthering Heights has been checked out by Maria Garcia.

The Great Gatsby has been checked out by Maria Garcia.

Robert Johnson will try and check out 4 book(s):

Frankenstein has been checked out by Robert Johnson.

Pride and Prejudice has been checked out by Robert Johnson.

To Kill a Mockingbird has been checked out by Robert Johnson.

Cannot check out 1984. Limit reached or book already checked out.

Sophia Chen will try and check out 4 book(s):

The Hobbit has been checked out by Sophia Chen.

War and Peace has been checked out by Sophia Chen.

Cannot check out Pride and Prejudice. Limit reached or book already checked out.

Madame Bovary has been checked out by Sophia Chen.

Michael Williams will try and check out 3 book(s):

A Tale of Two Cities has been checked out by Michael Williams.

Cannot check out The Hobbit. Limit reached or book already checked out.

Don Quixote has been checked out by Michael Williams.

Linda Martinez will try and check out 4 book(s):

The Lord of the Rings has been checked out by Linda Martinez.

The Grapes of Wrath has been checked out by Linda Martinez.

Cannot check out The Lord of the Rings. Limit reached or book already checked out.

Jane Eyre has been checked out by Linda Martinez.

David Miller will try and check out 4 book(s):

Cannot check out To Kill a Mockingbird. Limit reached or book already checked out.

Catch-22 has been checked out by David Miller.

Crime and Punishment has been checked out by David Miller.

Cannot check out Ulysses. Limit reached or book already checked out.

Elizabeth Kim will try and check out 4 book(s):

The Picture of Dorian Gray has been checked out by Elizabeth Kim.

Cannot check out The Lord of the Rings. Limit reached or book already checked out.

Fahrenheit 451 has been checked out by Elizabeth Kim.

Great Expectations has been checked out by Elizabeth Kim.

John Davis will try and check out 1 book(s):

Cannot check out Don Quixote. Limit reached or book already checked out.

Emily Rodriguez will try and check out 2 book(s):

Cannot check out Great Expectations. Limit reached or book already checked out.

Cannot check out Madame Bovary. Limit reached or book already checked out.

James Smith has checked out the following books:

Ulysses by James Joyce (Genre: Modernist)

Maria Garcia has checked out the following books:

The Brothers Karamazov by Fyodor Dostoevsky (Genre: Philosophical Fiction)

Wuthering Heights by Emily Bronte (Genre: Gothic Fiction)

The Great Gatsby by F. Scott Fitzgerald (Genre: Classic)

Robert Johnson has checked out the following books:

Frankenstein by Mary Shelley (Genre: Gothic Horror)

Pride and Prejudice by Jane Austen (Genre: Romance)

To Kill a Mockingbird by Harper Lee (Genre: Classic)

Sophia Chen has checked out the following books:

The Hobbit by J.R.R. Tolkien (Genre: Fantasy)

War and Peace by Leo Tolstoy (Genre: Historical Fiction)

Madame Bovary by Gustave Flaubert (Genre: Realist)

Michael Williams has checked out the following books:

A Tale of Two Cities by Charles Dickens (Genre: Historical Fiction)

Don Quixote by Miguel de Cervantes (Genre: Adventure)

Linda Martinez has checked out the following books:

The Lord of the Rings by J.R.R. Tolkien (Genre: Fantasy)

The Grapes of Wrath by John Steinbeck (Genre: Historical Fiction)

Jane Eyre by Charlotte Bronte (Genre: Gothic Fiction)

David Miller has checked out the following books:

Catch-22 by Joseph Heller (Genre: Satire)

Crime and Punishment by Fyodor Dostoevsky (Genre: Psychological Fiction)

Elizabeth Kim has checked out the following books:

The Picture of Dorian Gray by Oscar Wilde (Genre: Philosophical Fiction)

Fahrenheit 451 by Ray Bradbury (Genre: Dystopian)

Great Expectations by Charles Dickens (Genre: Classic)

John Davis has no books checked out.

Emily Rodriguez has no books checked out.

Note: since trainers are randomly assigned, result will have some variation.

**Requirements:**

|  |  |
| --- | --- |
| **Requirement** | **Sub Requirements** |
| Imports books\_data.xlsx | * + - Each row should become an object |
| Imports patrons\_data.xlsx | * + - Each row should become an object |
| Includes Book class | * + - Includes instance variables: title, author, genre, is\_checked\_out     - Includes constructor method |
| Includes Patron class | * + - Includes instance variables: patron\_id, name     - Includes constructor method |
| All Books stored in a list and all patrons stored in a list. |  |
| Book class has display\_info method | * Should display the title, author, and genre of the book |
| Patron has check\_out\_book method | * Checks if book is checked out and if patron has less than 3 books. * Changes book’s is\_checked\_out to True * Adds the book to the patron’s checked\_out\_books list * Prints out that a book was checked out * If it couldn’t be checked out, prints out message saying so. |
| Patron has display\_checked\_out\_books method | * Checks if the patron has at least one book checked out * If so, prints out message that they have the following books, and then runs the display\_info method on all of the books that they’ve checked out. * If they have no books checked out, it prints out a message saying so |
| Patrons try to check out 1-4 books | * Patrons should run check\_out\_book a random number of times between 1 and 4 with a randomly chosen book. * It should print out a message saying how many books they will try to check out. * A book should be chosen at random to check out each of the 1-4 times. |
| Display\_checked\_out\_books should be run on every patron |  |
| includes useful comments | * Should include a name and description at the top * Should also include comments throughout |