

HW3: CS 110X C 2013

Note: This homework (and all remaining homework assignments) is a **partner homework** and must be completed by each partner pair. When you complete this assignment, you must not share your answers with any other student. Only one person from a partner pair needs to submit the assignment.

Q1	Learn how to use list membership
<div data-bbox="191 548 370 625" style="border: 1px solid gray; padding: 2px; margin-bottom: 5px;"> Skills <input type="text"/> </div> <div data-bbox="191 657 370 768" style="border: 1px solid gray; padding: 2px;"> Lecture Dependency Jan-24 </div>	<p>Allow the user to enter in a list of values. Then print out the list of unique values, in sorted order from this list, one per line. Write a <code>showUniqueSorted()</code> function .</p> <div data-bbox="418 621 1336 1087" style="border: 1px solid gray; padding: 5px; margin-top: 10px;"> <p>Sample Output</p> <pre>>>> showUniqueSorted() Enter a list of values [a, b, c, ..., z]: [1,2,1,3,1,5,12,12,52,11,23,4,3] Unique values in sorted order: 1 2 3 4 5 11 12 23 52</pre> </div>

Q2	List management
<div data-bbox="191 1264 370 1341" style="border: 1px solid gray; padding: 2px; margin-bottom: 5px;"> Skills <input type="text"/> </div> <div data-bbox="191 1373 370 1484" style="border: 1px solid gray; padding: 2px;"> Lecture Dependency Jan-24 </div>	<p>Demonstrate your ability to manipulate lists and use the in operator. You are to write code to compute the mathematical union and intersection of two sets. The <i>Union</i> of two sets $A \cup B$ contains the unique elements found in either A or B. The <i>Intersection</i> of two sets $A \cap B$ contains the unique elements found in both A and B. The <i>Set Difference</i> $A - B = A - (A \cap B)$. That is, compute the intersection $A \cap B$ and remove these values from A. Write <code>demonstrateSetOperations()</code> function.</p> <div data-bbox="418 1488 1409 1724" style="border: 1px solid gray; padding: 5px; margin-top: 10px;"> <p>Sample Output</p> <pre>>>> demonstrateSetOperations() Enter set A of values [a, b, c, ..., z]: [1,8,3,6,7,2] Enter set B of values [a, b, c, ..., z]: [3,22,7,6,4] The UNION is [1, 2, 3, 4, 6, 7, 8, 22] The INTERSECTION is [3, 6, 7] The DIFFERENCE is [1, 2, 8]</pre> </div>

Q3	Demonstrate multi-way decision logic
<div data-bbox="191 331 370 407" style="border: 1px solid black; padding: 2px; margin-bottom: 5px;"><i>Skills</i></div> <div data-bbox="191 443 370 518" style="border: 1px solid black; padding: 2px; margin-bottom: 5px;"><i>Lecture Dependency</i></div> <div data-bbox="191 520 370 554" style="border: 1px solid black; padding: 2px;"><i>Jan-25</i></div>	<p data-bbox="396 302 1433 510">You are guiding a remote robot using simple commands. Initially its location is defined by a coordinate $(x,y) = (0,0)$. You can move the robot "UP" and it moves 1 unit in the y-direction. Move the robot "RIGHT" and it moves 1 unit in the x-direction. Move "DOWN" and the robot moves -1 unit in the y-direction; move "LEFT" and the robot moves -1 unit in the x-direction. Write a program to execute 10 commands, reporting on location after every command; then plot path of the robot as shown below.</p> <div data-bbox="418 548 846 1310" style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p>Sample Output</p> <pre> >>> moveRobot () Robot at (0,0) Enter Command: UP Robot at (0,1) Enter Command: UP Robot at (0,2) Enter Command: RIGHT Robot at (1,2) Enter Command: DOWN Robot at (1,1) Enter Command: RIGHT Robot at (2,1) Enter Command: DOWN Robot at (2,0) Enter Command: DOWN Robot at (2,-1) Enter Command: LEFT Robot at (1,-1) Enter Command: LEFT Robot at (0,-1) Enter Command: DOWN Robot at (0,-2) </pre> </div> <div data-bbox="870 562 1078 726" style="text-align: center; margin-bottom: 10px;"> </div> <div data-bbox="870 758 1386 1163"> </div> <p data-bbox="396 1352 1433 1415">When you are done, there will be eleven scattered points on the plot above. You can assume the user will always enter in a valid robot command.</p>

The context for the following questions is the enrollment of students in classes. Have you wondered about the incredible investment WPI makes in software applications to manage the scheduling and enrollment of students in classes? This infrastructure makes it possible for students to register for classes in seconds instead of hours. Much of this domain will be familiar to you, though I am going to simplify things to make this a reasonable homework assignment.

You are given a list of enrollment information that looks like the following:

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0123456789-123456789-123456789-123456789-123456789-123456789-123456789-123456789-123
BE GAUDETTE, G. R. GRG1BME 3111B01 Crystal, Shaun 92525640114CS PHYSIOLOGY AND ENGINEERING
CE LEPAGE, S. SL11CE 3070B01 Crystal, Shaun 92525640114CS URBAN & ENVIRONMENTAL PLA
CS CLAYPOOL, M. L. MLC1IMGD1001B01 Dahbar, Gilmar 67954447214CS THE GAME DEVELOPMENT PROC
    
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Each row of this information table contains a specific piece of enrollment data (in this case, Shaun Crystal has enrolled in both BME 3111 and CE 3070, while Gilmar Dahbar has only 1 IMGD 1001 course). The fields in the enrollment data (identified by character index value) are as follows:

0-2	Department of Prof.	32-34	Course Section
4-19	Professor	36-60	Student Name
20-22	Initials	61-69	Student ID
23	ProjectType	70-71	Student YOG
24-27	Course Department	72-74	Student Major
28-31	Course Number	78-104	Course Title

Your system must be able to produce the following reports from the available enrollment data

Q4	Generate Report				
<table border="1" style="width: 100%;"> <tr> <td style="background-color: #d3d3d3; color: red;">Skills</td> <td></td> </tr> <tr> <td style="background-color: #d3d3d3; color: red;">Lecture Dependency</td> <td>Jan-24</td> </tr> </table>	Skills		Lecture Dependency	Jan-24	<p>Write a Python function <code>showScheduleForStudent()</code>. This function will print the courses enrolled by a student, given that student's ID. The order of the courses being printed does not matter.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Sample Output</p> <pre> >>> showScheduleForStudent () Enter student id: 925256401 BME 3111 PHYSIOLOGY AND ENGINEERING CE 3070 URBAN & ENVIRONMENTAL PLA CS 3733 SOFTWARE ENGINEERING >>> showScheduleForStudent () Enter student id: 234 No schedule for student 234 </pre> </div> <p>If there is no enrollment data for the given student ID, then you must output "No schedule for student ID"</p>
Skills					
Lecture Dependency	Jan-24				

Q5	Generate Report
<div data-bbox="191 331 367 407" style="border: 1px solid black; padding: 2px;">Skills</div> <div data-bbox="191 443 367 554" style="border: 1px solid black; padding: 2px;">Lecture Dependency Jan-24</div>	<p>Write a Python function <code>showStudentsInClass()</code>. This function will print the list of students enrolled in a specific course (identified by Department and Number). The order of students doesn't matter; a final row of output tells the total number of students enrolled in the course.</p> <p>Be careful when dealing with the departments, since some departments have 2 letters, some have 3, and some have 4. Every course number will have four digits/letters. Note that some courses (such as PH 210X) are experimental and thus have a letter in the "number".</p> <p>If there is no enrollment data for the given course, then you must output "No students enrolled in COURSE"</p> <div data-bbox="716 646 1430 1100" style="border: 1px solid black; padding: 5px;"> <p style="text-align: center; margin: 0;">Sample Output</p> <pre style="margin: 0;"> >>> showStudentsInClass() Enter course dept CS Enter course number 3733 Charette, Daniel Cozzens, Frederick Crystal, Shaun Dahbar, Gilmar Deschler, Bianca 5 students >>> showStudentsInClass() Enter course dept ME Enter course number 1321 No students enrolled in ME 1321 </pre> </div>

Q6	Generate Report
<div data-bbox="191 1251 367 1327" style="border: 1px solid black; padding: 2px;">Skills</div> <div data-bbox="191 1362 367 1474" style="border: 1px solid black; padding: 2px;">Lecture Dependency Jan-24</div>	<p>Write a <code>departmentSummary()</code> function for enrollment data that summarizes the total number of students by the department of the professor teaching the course. Be sure that the output shows the departments in sorted order.</p> <p>This is a stretch question. You cannot assume that you know the full set of departments in advance. That is, you must process all enrollment data and uncover the departments as you go.</p> <p><i>Hint: Consider managing two lists. <code>depts</code> contains the list of departments seen so far, while <code>totals</code> contains the count of students taught by a professor in that department. Think about how you would 'grow' these lists as you encounter new departments...</i></p> <div data-bbox="964 1451 1430 1780" style="border: 1px solid black; padding: 5px;"> <p style="text-align: center; margin: 0;">Sample Output</p> <pre style="margin: 0;"> >>> departmentSummary() BE 1 CE 1 CS 6 ECE 1 HU 1 MA 1 MG 1 PH 3 </pre> </div>

Initial Version: 1/24/2013

How To Get Started On This Assignment

A template [HW3.py](#) file is provided to you with sample enrollment data.

Submit your HW3.py file using the web-based turnin system. As we have mentioned in class, only one of the team members needs to submit the assignment. But just make sure that something gets submitted!