Program Assignments – While Loops. Develop an IPO for each of the problems below. Place the IPO into your repository. Then write code for each problem and place those files (py) into your repository. Paste the link to your repository into the Assignment Completion Link on Blackboard.

1. Display the odd numbers starting at 1 and ending with 25. Use a while loop structure for this problem.

|  |  |  |
| --- | --- | --- |
| Input | Process | Output |
| Set Start equal to 1  Set End equal to 25 | While Start <= to End display Start and add 2 to start | Display Start Values |

1. Allow the user to enter a start value, stop value and increment value from the keyboard. Display all the numbers from the start value to stop value using the increment value as you proceed. Use a while loop structure for this problem.

|  |  |  |
| --- | --- | --- |
| Input | Process | Output |
| Start Value  End Value  Increment Value | While Start <= to End, Display Start and add Increment Value to Start Value | Display Start Values |

1. Prompt the user on whether they want to do this program **(just before the while loop**). “Yes” entry means they want to continue. Any other response indicates they will stop the program. This response is the loop control variable. If the user answers “Yes “then go into the while loop.

Once in the while loop. You are to prompt the user for their last name and two exam scores. Compute the average exam score. Display last name and average. After the loop, display a count of the number of students who entered data.

Finally, the **last statements** **within the while loop** will ask the user if they want to do this loop again. In other words the user needs to be prompted again. The reason is that the end of the loop takes execution to the while condition to be evaluated again. It can not take us to the first few lines of code that prompt the user for the first time. That code is out of the loop. Therefore, we need a second prompt at the bottom, inside the loop.

|  |  |  |
| --- | --- | --- |
| Input | Process | Output |
| Confirmation  Last Name  First Exam Score  Second Exam Score | Set Users to 0  While Confirmation == Yes, prompt for Last Name and First Exam Score and Second Exam Score  Find Average Score by adding First and Second exam scores and dividing by 2  Add 1 to Users  Prompt for Repeat | Display Last Name  Display Average Score  Display Users |

1. Prompt the user on whether they want to do this program **(just before the while loop**). Yes means they want to continue. Any other response indicates they will stop the program. This response is the loop control variable. If the user answers Yes then go into the while loop.

Once in the while loop. You are to prompt the user for employee last name, hours worked and rate of pay. Compute gross pay. Give the employee time and a half for hours worked over 40. Sum the gross pay and count the number of employees.

For each employee display their last name and gross pay.

After the loop (all data entered) display the sum of all the gross pays, and count of the number of employees. Compute and display the average pay.

Finally, the **last statements** **within the while loop** will ask the user if they want to do this loop again. In other words the user needs to be prompted again. The reason is that the end of the loop takes execution to the while condition to be evaluated again. It can not take us to the first few lines of code that prompt the user for the first time. That code is out of the loop. Therefore, we need a second prompt at the bottom, inside the loop.

|  |  |  |
| --- | --- | --- |
| Input | Process | Output |
| Confirmation  Last Name  Hours Worked  Hourly Rate | Employees = 0  Total Gross Pay = 0  While Confirmation == Yes, ask for Last Name, Hours Worked, and Hourly Pay  If Hours > 40, set Gross pay to 40 \* Rate + 1.5 \* Rate \* (Hours - 40)  Otherwise set Gross Pay to (Hours \* Rate)  Total Gross = Total Gross + Gross Pay  Add 1 to Employees  Find Average Gross by dividing Total Gross by Employees  Display Last Name  Display Gross Pay  Prompt For continuation | Display Employees  Display Total Gross Pay  Display Average Gross Pay |

1. Prompt the user on whether they want to do this program **(just before the while loop**). Yes means they want to continue. Any other response indicates they will stop the program. This response is the loop control variable. If the user answers Yes then go into the while loop.

Once in the while loop. You are to prompt the user for quantity and price of an item. Compute extended price (quantity times price of an item. If the extended price is greater than 10000.00 compute a discount of 25%. All other orders get a 10% discount. For each order display extended price, discount amount (extended price x discount percent), total (extended price – discount amount).

For each order sum the discount amount.

After the loop (all data entered) display the sum of all the discounts.

Finally, the **last statements** **within the while loop** will ask the user if they want to do this loop again. In other words the user needs to be prompted again. The reason is that the end of the loop takes execution to the while condition to be evaluated again. It can not take us to the first few lines of code that prompt the user for the first time. That code is out of the loop. Therefore, we need a second prompt at the bottom, inside the loop.

|  |  |  |
| --- | --- | --- |
| Input | Process | Output |
| Confirmation  Quantity  Price | Set Total Discount = 0  While Confirmation == Yes, find Extended Price by multiplying Quantity by Price  If Extended Price > 10000, set Discount Percent to 0.25, otherwise set to 0.1  Find Discount Amount by multiplying Extended Price by Discount Percent  Find Total Price by subtracting Discount Amount from Extended Price  Total Discount = Total Discount + Discount Amount  Display Extended Price  Display Discount Amount  Display Total Price  Prompt for Confirmation | Display Total Discount |