

PYTHON PROGRAMMING

LAB 04 ITERATIVE CONTROL STRUCTURES

OBJECTIVES

In this lab assignment, students will learn:

- How to use loops to solve problems
- How to write while statements
- How to write indefinite loops
- How to write definite loops

GOALS

In this lab assignment, students will demonstrate the abilities to:

- Use loops to solve problems
- Write while statements
- Write indefinite loops
- Write definite loops

INSTRUCTION AND PROBLEMS

Write a Python program for each of the problems in this lab.

Please use Jupyter Notebook or Python IDE (like Spyder) to type and test your programs. Attached the Python files (.ipynb or .py files) in your email. In this lab, you should submit 4 Python files, one for each problem.

PROBLEM 1

A high school senior is applying for colleges. He wants a program to calculate the out-of-pocket cost for attending each college he is applying. The out-of-pocket cost is determined by the following formula:

$$\text{out-of-pocket cost} = \text{tuition} + \text{room} + \text{board} + \text{other expenses} - \text{financial aid}$$

Write a program to calculate the out-of-pocket cost of every college he is applying. After each college, ask the user whether to calculate cost for another college. Enter 'y' for yes. The following is an example:

```
Enter name of college: NCSU
Enter tuition: 8500
Enter room: 6000
Enter board: 4000
Enter other expenses: 3000
Enter financial aid: 2000
Out-of-pocket cost for this college: 19500
Calculate cost for another college? [y/n] y

Enter name of college: Jefferson College
Enter tuition: 35000
Enter room: 7000
Enter board: 4500
Enter other expenses: 5000
Enter financial aid: 22000
Out-of-pocket cost for this college: 29500
Calculate cost for another college? [y/n] y

Enter name of college: Freedom University
Enter tuition: 20000
Enter room: 10000
Enter board: 5000
Enter other expenses: 5000
Enter financial aid: 30000
Out-of-pocket cost for this college: 10000
Calculate cost for another college? [y/n] n
```

Save your Python program in a file named **Lab04P1.py**.

PROBLEM 2

We wrote the following program to calculate BTU needed to cool a room.

```
roomLength = float(input('Enter room length: '))
roomWidth = float(input('Enter room width: '))
roomHeight = float(input('Enter room height: '))
roomVolume = roomLength * roomWidth * roomHeight
btuNeeded = roomVolume * 3.5
print('BTU needed for this room:', btuNeeded)
```

Modify the program by adding error checking loops. Room length, width and height must all be greater than 0. Every time the user enters a negative number, display an error message and ask the user to re-enter a valid value immediately. The following is an example

```
Enter room length: -12
Error: Room length cannot be negative.
Enter room length: 15
Enter room width: -11
Error: Room width cannot be negative.
Enter room width: 11
Enter room height: -10
Error: Room height cannot be negative.
Enter room height: 10
BTU needed for this room: 5775.0
```

Save your Python program in a file named **Lab04P2.py**.

PROBLEM 3

An online store is selling DVDs for \$4.99 each. The buyer pays a shipping and handling fee of \$2.99 for the whole order. Write a program to calculate the bill for multiple customers. First ask the user to enter the number of customers. Then for each customer, enter the number of DVDs purchased. Calculate and display the bill for each customer. The following is an example.

```
How many customers? 3

Customer 1
Enter number of discs purchased: 2
Please pay this amount: 12.97

Customer 2
Enter number of discs purchased: 1
Please pay this amount: 7.98

Customer 3
Enter number of discs purchased: 6
Please pay this amount: 32.93
```

Save your Python program in a file named **Lab04P3.py**.

PROBLEM 4

A classical music radio station is currently raising fund. Listeners call in to make a donation to support the station. Write a program to do the following. Ask the user to enter the number of donors today. Then use a loop to get the amount donated by each donor. Calculate and display the total donation for the day. The following are two examples:

```
How many people made donations today? 6
You will be asked to enter the amount of donation made by each donor.
Enter amount of donation: 50
Enter amount of donation: 100
Enter amount of donation: 80
Enter amount of donation: 70
Enter amount of donation: 50
Enter amount of donation: 40
Total amount of money raised today: 390
```

```
How many people made donations today? 4
You will be asked to enter the amount of donation made by each donor.
Enter amount of donation: 400
Enter amount of donation: 60
Enter amount of donation: 75
Enter amount of donation: 30
Total amount of money raised today: 565
```

Save your Python program in a file named **Lab04P4.py**.

Grading rubric for Each Problem

Writing loop [15 points]
Other statements [10 points]