
PYTHON PROGRAMMING

HOMEWORK FOR CLASS WEEK 03

SELECTION CONTROL STRUCTURE

OBJECTIVES

In this lab assignment, students will learn:

- How to use selection control structures in Python programs
- How to write `if` statements
- How to use `elif` headers
- How to write nested `if` statements

GOALS

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

- Use selection control structures in Python programs
- Write `if` statements
- Use `elif` headers
- Write nested `if` statements

INSTRUCTION AND PROBLEMS

Write a Python program for each of the problems in this lab. The following is an example.

A bank requires customers to have a minimum salary of \$30,000 and at least 2 years on the job to qualify for a loan. Write a program to check whether a customer qualifies.

Python program:

```
salary = float(input('Enter your annual salary: '))
years_on_job = float(input('Enter the number of years employed: '))
if salary >= 30000 and years_on_job >= 2:
    print('You qualify for the loan')
else:
    print('You do not qualify for this loan')
```

Please launch your **Jupyter Notebook** application to type and test your programs. In this lab, you should submit 5 Python files, one for each problem.

PROBLEM 1

There are two exams in a programming course. Write a program to calculate a student's total score. To encourage students to do better in the final exam, if a student has improved by more than 20 points from midterm to final, the student will receive 5 bonus points in the total. Write a Python program to do the following. Calculate and display total score before bonus. If a student receives extra points, display a text message about improvement bonus and new total score. The following are two examples.

```
Enter midterm score: 80
Enter final score: 85
Total Score: 165
```

```
Enter midterm score: 70
Enter final score: 95
Total Score: 165
5 bonus points added to total for meeting improvement target.
New total score: 170
```

Save the correct program in a file named **Lab04-1.py**. Submit the file for credit.

PROBLEM 2

We saw a program about determining the number of BTU needed to cool a room before. The program asks the user to enter the room's length, width and height, and uses the following formula to calculate the number of BTU needed:

$$\text{BTU needed} = \text{room volume} * 3.5$$

Now we want to add one more consideration. If the room gets a lot of sunlight, number of BTU needed will increase by 20%. The program needs to ask the user whether the room gets a lot of sunlight. The user answers 'yes' or 'no'. Adjust the number of BTU needed if necessary. The following are two examples.

```
Enter room length: 15
Enter room width: 12
Enter room height: 10
Does the room get a lot of sunlight? [yes/no] no
BTU needed for the air conditioner: 6300
```

```
Enter room length: 15
Enter room width: 12
Enter room height: 10
```

Does the room get a lot of sunlight? [yes/no] yes
BTU needed for the air conditioner: 7560

Save your Python program in a file named **Lab04-2.py**. Submit the file for credit.

PROBLEM 3

North Carolina state law requires all children to ride in a booster seat until either the child has reached age 8 or has exceeded 70 pounds. Write a program to determine whether a child needs to ride in a booster seat. Ask the age and weight of the child, then decide whether booster seat is required. The following are two examples.

Enter age: 7
Enter weight: 60
This child must use a booster seat.

Enter age: 7
Enter weight: 75
This child does not need a booster seat.

Save your Python program in a file named **Lab03-3.py**. Submit the file for credit.

PROBLEM 4

A company gives volume discount to customers of their software product. Unit price depends on number of copies purchased:

Number of copies purchased	Unit price
1 - 10	\$99
11 - 50	\$89
51 - 100	\$79
101 or more	\$69

Write a program to do the following. Ask the customer how many copies he is buying. Display the unit price. Calculate and display total price. For example, if a customer is buying 20 copies, unit price will be \$89 and total price will be \$1780. The following are two examples.

How many copies are you buying? 25
Unit price: \$89

Total price: \$2225

How many copies are you buying? 100

Unit price: \$79

Total price: \$7900

Save your Python program in a file named **Lab04-4.py**. Submit the file for credit.

PROBLEM 5

Residential and business customers are paying different rates for water usage. Residential customers pay \$0.004 per gallon for the first 8000 gallons. If the usage is more than 8000 gallons, the rate will be \$0.007 per gallon after the first 8000 gallons. Business customers pay \$0.005 per gallon for the first 10000 gallons. If the usage is more than 10000 gallons, the rate will be \$0.009 per gallon after the first 10000 gallons. For example, if a business customer has used 12000 gallons, they need to pay \$50 for the first 10000 gallons ($\$0.005 * 10000$), plus \$18 for the other 2000 gallons ($\$0.009 * 2000$). Write a program to do the following. Ask the user which type the customer it is and how many gallons of water have been used. Calculate and display the bill. The following are two examples:

Enter R for residential customer or B for business customer: B

How many gallons of water were used? 12000

Please pay this amount: 68

Enter R for residential customer or B for business customer: R

How many gallons of water were used? 9500

Please pay this amount: 42.5

Save your Python program in a file named **Lab04-5.py**. Submit the file for credit.

GRADING RUBRIC FOR EACH PROBLEM

Writing correct if statements [15 points]

Other statements [5 points]