\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**CSC121 PYTHON ProgrammiNG**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

LAB 03 **SELECTION CONTROL STRUCTURE**

**SOLUTION**

Warning: This document is copyrighted and confidential. Showing any part of this document to anybody in any form, including but not limited to posting it on the Internet, is prohibited and considered as helping other students to cheat. Violators will be punished.

# 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 use PyCharm to type and test your programs. Submit the Python files to Blackboard for credit. In this lab, you should submit 5 Python files, one for each problem.

## Problem 1

Write a program to calculate the number of seconds since midnight. For example, suppose the time is 1:02:05 AM. Since there are 3600 seconds per hour and 60 seconds per minutes, it has been 3725 seconds since midnight (3600 \* 1 + 2 \* 60 + 5 = 3725). The program asks the user to enter 4 pieces of information: hour, minute, second, and AM/PM. The program will calculate and display the number of seconds since midnight. [Hint: be very careful when the hour is 12].

The following are some examples.

Enter hour: 1

Enter minute: 2

Enter second: 5

Enter AM or PM: AM

Seconds since midnight: 3725

Enter hour: 11

Enter minute: 58

Enter second: 59

Enter AM or PM: PM

Seconds since midnight: 86339

Enter hour: 12

Enter minute: 7

Enter second: 20

Enter AM or PM: AM

Seconds since midnight: 440

Enter hour: 12

Enter minute: 14

Enter second: 57

Enter AM or PM: PM

Seconds since midnight: 44097

Save the correct program in a file named **Lab03P1.py**. Submit the file to Blackboard for credit.

Solution:

*hour = int(input("Enter hour: "))*

*minute = int(input("Enter minute: "))*

*second = int(input("Enter second: "))*

*am\_pm = input("Enter AM or PM: ")*

*am\_pm = am\_pm.upper()*

*if hour == 12:*

*hour = hour - 12*

*if am\_pm == "PM":*

*hour = hour + 12*

*seconds\_midnight = hour \* 3600 + minute \* 60 + second*

*print("Seconds since midnight: ", seconds\_midnight)*

## Problem 2

Write a program to do the opposite of Program 1. Ask the user to enter the number of seconds since midnight. Calculate and display the time, including hour, minute, second and AM/PM. [Hint: Review truncating division and modulus operator in Lesson 02. You probably need to use them.]

The following are some examples.

Enter number of seconds since midnight: 3725

The time is 1 : 2 : 5 AM

Enter number of seconds since midnight: 86339

The time is 11 : 58 : 59 PM

Enter number of seconds since midnight: 440

The time is 12 : 7 : 20 AM

Enter number of seconds since midnight: 44097

The time is 12 : 14 : 57 PM

Save your Python program in a file named **Lab03P2.py**. Submit the file to Blackboard for credit.

Solution:

*seconds\_midnight = int(input("Enter number of seconds since midnight: "))*

*hour = seconds\_midnight // 3600*

*seconds\_left = seconds\_midnight % 3600*

*minute = seconds\_left // 60*

*second = seconds\_left % 60*

*if hour >= 12:*

*hour = hour - 12*

*am\_pm = "PM"*

*else:*

*am\_pm = "AM"*

*if hour == 0:*

*hour = 12*

*print("The time is", hour, ":", minute, ":", second, am\_pm)*

## Problem 3

Write a program to find the largest value. Ask the user to enter three numbers. Compare them and report the largest one. [Hint: The user is free to enter any three numbers. Some or all of them may be the same. Take this into consideration when you compare the numbers.]

The following are some examples.

Enter first number: 7

Enter second number: 14

Enter third number: 10.5

The largest number is: 14.0

Enter first number: 17

Enter second number: 15

Enter third number: 17

The largest number is: 17.0

Enter first number: 7

Enter second number: 7

Enter third number: 7

The largest number is: 7.0

Save your Python program in a file named Lab03P3.py. Submit the file to Blackboard for credit.

**Solution:**

*a = float(input("Enter first number: "))*

*b = float(input("Enter second number: "))*

*c = float(input("Enter third number: "))*

*if a >= b and a >= c:*

*print("The largest number is: ", a)*

*elif b >= a and b >= c:*

*print("The largest number is: ", b)*

*else:*

*print("The largest number is: ", c)*

## Problem 4

A shipping company allows customers to choose between standard or express delivery. Standard deliveries are charged the following rates:

|  |  |
| --- | --- |
| Weight | Rate per pound |
| 4 pounds or less | $1.05 |
| Over 4 pounds but no more than 8 pounds | $0.95 |
| Over 8 pounds but no more than 15 pounds | $0.85 |
| Over 15 pounds | $0.80 |

Express deliveries are charged the following rates:

|  |  |
| --- | --- |
| Weight | Rate per pound |
| 2 pounds or less | $3.25 |
| Over 2 pounds but no more than 5 pounds | $2.95 |
| Over 5 pounds but no more than 10 pounds | $2.75 |
| Over 10 pounds | $2.55 |

Write a program to do the following. Ask the customer to enter “S” for standard shipping or “E” for express shipping. Also ask the user to enter the weight of the package in pounds. Calculate and display shipping charge. The following are some examples.

Enter S for standard shipping, E for express: S

Enter weight (lbs): 12.5

Shipping charge: 10.625

Enter S for standard shipping, E for express: E

Enter weight (lbs): 4.8

Shipping charge: 14.16

Save your Python program in a file named **Lab03P4.py**. Submit the file to Blackboard for credit.

**Solution:**

*shipping = input("Enter S for standard shipping, E for express: ")*

*shipping = shipping.upper()*

*if shipping == "S":*

*weight = float(input("Enter weight (lbs): "))*

*if weight <= 4:*

*charge = 1.05 \* weight*

*elif 4 < weight <= 8:*

*charge = 0.95 \* weight*

*elif 8 < weight <= 15:*

*charge = 0.85 \* weight*

*elif 15 < weight:*

*charge = 0.80 \* weight*

*elif shipping == "E":*

*weight = float(input("Enter weight (lbs): "))*

*if weight <= 2:*

*charge = 3.25 \* weight*

*elif 2 < weight <= 5:*

*charge = 2.95 \* weight*

*elif 5 < weight <= 10:*

*charge = 2.75 \* weight*

*elif 10 < weight:*

*charge = 2.55 \* weight*

*print("Shipping charge: ", charge)*

## Problem 5

Residential and business customers are paying different rates for water usage. Residential customers pay $0.005 per gallon for the first 6000 gallons. If the usage is more than 6000 gallons, the rate will be $0.007 per gallon after the first 6000 gallons. Business customers pay $0.006 per gallon for the first 8000 gallons. If the usage is more than 8000 gallons, the rate will be $0.008 per gallon after the first 8000 gallons. For example, a residential customer who has used 9000 gallons will pay $30 for the first 6000 gallons ($0.005 \* 6000), plus $21 for the other 3000 gallons ($0.007 \* 3000). The total bill will be $51. A business customer who has used 9000 gallons will pay $48 for the first 8000 gallons ($0.006 \* 8000), plus $8 for the other 1000 gallons ($0.008 \* 1000). The total bill will be $56. 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 some examples:

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

How many gallons of water were used? 9000

Please pay this amount: 56

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

How many gallons of water were used? 9000

Please pay this amount: 51

Save your Python program in a file named **Lab03P5.py**. Submit the file to Blackboard for credit.

**Solution:**

*customer = input('Enter R for residential customer or B for business customer: ')*

*customer = customer.upper()*

*waterUsage = float(input('How many gallons of water were used? '))*

*if customer == 'R':*

*if waterUsage <= 6000:*

*waterBill = waterUsage \* 0.005*

*else:*

*waterBill = 6000 \* 0.005 + (waterUsage - 6000) \* 0.007*

*elif customer == 'B':*

*if waterUsage <= 8000:*

*waterBill = waterUsage \* 0.006*

*else:*

*waterBill = 8000 \* 0.006 + (waterUsage - 8000) \* 0.008*

*print('Please pay this amount:', waterBill)*

# Grading rubric for Each Problem

Writing correct if statements [15 points]

Other statements [5 points]