National University of Computer and Emerging Sciences

Lab Manual

for

Programming Fundamentals

Course Instructor	Mr. Aftab Alam
Lab Instructor(s)	Ms. Huda Mr. Shahzaib Khan
Section	BSCS-N
Semester	Fall 2021

Department of Computer Science

FAST-NU, Lahore, Pakistan

Objectives:

In this lab we will learn

- Switch statements
- Control Structures e.g. while loops

Practice Questions:

Q 1)

```
// The switch statement in this program uses the "fall through"
// feature to catch both uppercase and lowercase letters entered
// by the user.
#include <iostream>
using namespace std;

int main()
{
     char feedGrade;

     // Get the desired grade of feed.
     cout << "Our pet food is available in three grades:\n";
     cout << "A, B, and C. Which do you want pricing for? ";
     cin >> feedGrade;

     // Display the price.
     switch(feedGrade)
     {
          case 'a':
          case 'A': cout << "30 cents per pound.\n";
                    break;
          case 'b':
          case 'B': cout << "20 cents per pound.\n";
                    break;
          case 'c':
          case 'C': cout << "15 cents per pound.\n";
                    break;
          default:  cout << "That is an invalid choice.\n";
     }
     return 0;
}
```

Q

Program Output with Example Input Shown in Bold

```
Our pet food is available in three grades:
A, B, and C. Which do you want pricing for? b [Enter]
20 cents per pound.
```

Program Output with Example Input Shown in Bold

```
Our pet food is available in three grades:
A, B, and C. Which do you want pricing for? B [Enter]
20 cents per pound.
```

Q 2)

```
char grade;
double gpa = 0.0;
cout<<"Enter your grade"<<endl;
cin>>grade;
switch(grade)
{
     case 'A':
          gpa = 4.0;
     case 'B':
          gpa = 3.0;
     case 'C':
          gpa = 2.0;
     case 'D':
          gpa = 1.0;
     case 'F':
          gpa = 0.0;
          cout<<"Failed";
          break;
     default:
          cout<<"Invalid grade entered";
 }
     cout<<"Your gpa is"<<gpa<<endl;
```

- Run the code in your main.
- Identify the logical error.
- Correct it.

Q 3)

Fill out the table by entering values of mentioned variable/while condition on each line of iteration of while loop given in code snippet. An example is given for iteration 1.

```
1-      int itr=1, multiplier=3;
2-      while(itr<5 ||multiplier<18)
        {
3-          multiplier=multiplier*itr;
4-          itr++;
5-          cout<<itr;
        }
```

Loop Iteration	Line :1	Line :2	Line:3	Line : 4	Line :5
1	itr=1 multiplier=3	Itr=1 multiplier=3 while(itr<9 ||multiplier<18)=True	multiplier=3	itr=1	itr=2
2					
3					
4					
5					

Q4) \\ write the program to determine the average number of calories burned in a week.

```
#include <iostream>

using namespace std;

int main()
{
    int calBurnedInADay;
    int calBurnedInAWeek;
    int day;

    day = 1;
    calBurnedInAWeek = 0;

    while (day <= 7)
    {
        cout << "Enter calories burned day " << day << ": ";
        cin >> calBurnedInADay;
        cout << endl;

        calBurnedInAWeek = calBurnedInAWeek + calBurnedInADay;
        day = day + 1;
    }

    cout << "Average number of calories burned each day: "
         << calBurnedInAWeek / 7 << endl;

    return 0;
}
```

Sample Run: In this sample run, the user input is shaded.

```
Enter calories burned day 1: 375

Enter calories burned day 2: 425

Enter calories burned day 3: 270

Enter calories burned day 4: 190

Enter calories burned day 5: 350

Enter calories burned day 6: 200

Enter calories burned day 7: 365

Average number of calories burned each day: 310
```

Problems:

Problem 1: (Switch statement)

In the Chinese calendar, every year is associated with a particular animal. The 12-year animal cycle is rat, ox, tiger, rabbit, dragon, snake, horse, goat, monkey, rooster, dog, and boar. The year 1900 is a year of the rat; thus 1901 is a year of the ox and 1912 is another year of the rat. If you know in what year a person was born, you can compute the offset from 1900 and determine the animal associated with that person's year of birth. Create a program using SWITCH structure that determines the animal corresponding to an input year of birth. Assume that the input year is 1900 or later. The program should take as input the year of birth in a variable of type int. The program should then display the corresponding animal.

After completing the program test it for following inputs.

Input	Output
Year	Animal
1942	Horse
1901	
1989	
1945	

Problem 2: (while)

Write a C++ program that calculates Power (X^Y) of any positive number, you will take X and Y as input.

if X = 4 and Y = 3 then your code should Output:

4 power 3 of Number is 64

if X = 4 and Y = -3 then your code should Output:

4 power -3 of Number is 0.015625

Problem 3: (while)

You are conducting a food survey for quality of food at your canteen. Your target audience is your class whom you will ask to rank the food. The quality ranges from (1-5). 1 for worst and 5 for excellent. Write a C++ program for finding frequency of each food quality rank. Let's say, if have collected 10 such responses from your class:

Opinion:

1

1

5

1

2

3

5

5

1

The output should be:

Frequency of rank 1 is :4

Frequency of rank 2 is: 1

Frequency of rank 3 is: 1

Frequency of rank 4 is: 0

Frequency of rank 5 is: 3

Problem 4: (if/else)

Days in a Month Write a program that asks the user to enter the month (letting the user enter an integer in the range of 1 through 12) and the year. The program should then display the number of days in that month. Use the following criteria to identify leap years:

1. Determine whether the year is divisible by 100. If it is, then it is a leap year if and only if it is divisible by 400. For example, 2000 is a leap year but 2100 is not.

2. If the year is not divisible by 100, then it is a leap year if and if only it is divisible by 4. For example, 2008 is a leap year but 2009 is not.

Here is a sample run of the program:

Enter a month (1-12): 2 [Enter]

Enter a year: 2008 [Enter]

29 days