**ITCS 1212L**

**Lab 6**

# Iteration structures (Loops)

**Learning Objectives:**

* **Learning about different types of iteration structures (Loops)**

1. Write the following and compile it.
2. This program is not user friendly. Run it a few times and explain why. For starters, it’s missing #include <iostream> which prevents the program from using the cout statement. Once fixed, the program lacks any structure or white space for easy reading of the code. Next, when run, the program does not provide good instructions to the user. The output is formatted poorly. The user is stuck in an infinite loop unless they know to enter ‘x’ otherwise they are forced to alt+f4 the program.
3. Add to the code so that the program is more user friendly. Done.
4. How would this code affect the execution of the program if the while loop is replaced by a do-while loop? Try it and see. Done. This change made NO difference in the functionality of this program because the value of letter is inputted and printed within the loop itself.

using namespace std;

int main()

{

char letter = 'a';

while (letter != 'x')

{

cout << "Please enter a letter" << endl;

cin >> letter;

cout << "The letter you entered is " << letter << endl;

}

return 0;

}

1. Complete the following program above by filling in the code described in the statements in bold so that it will perform the indicated task.
2. Run the program several times with various input. Record your results. Are they correct? What happens if you enter –1 first? What happens if you enter only values of 0 for one or more months? Is there any numerical data that you should not enter?
3. What is the purpose of the following code in the program above?

if (month == 1)

cout << "No data has been entered" << endl;

//Program

#include <iostream>

using namespace std;

int main()

{

**// Fill in the code to define and initialize to 1 the variable month**

float total = 0, rain;

cout << "Enter the total rainfall for month " << month << endl;

cout << "Enter -1 when you are finished" << endl;

**// Fill in the code to read in the value for rain**

**// Fill in the code to start a while loop that iterates**

**// while rain does not equal -1**

{

**// Fill in the code to update total by adding it to rain**

**// Fill in the code to increment month by one**

cout << "Enter the total rainfall in inches for month "

<< month << endl;

cout << "Enter -1 when you are finished" << endl;

**// Fill in the code to read in the value for rain**

}

if (month == 1)

cout << "No data has been entered" << endl;

else

cout << "The total rainfall for the " << month-1

<< " months is "<< total << " inches." << endl;

return 0;

}

1. Fill in the indicated code to complete the following program. Then compile and run the program several times with various inputs. Try all the possible relevant cases and record your results.
2. What do you think will happen if you do not enter A, B, C, D or E? Try running the program and inputting another letter.
3. Replace the line

if (validBeverage == true)

with the line

if (validBeverage)

and run the program again. Are there any differences in the execution of the program? Why or why not?

#include <iostream>

#include <iomanip>

using namespace std;

int main()

{

**// Fill in the code to define an integer variable called number,**

**// a floating point variable called cost,**

**// and a character variable called beverage**

bool validBeverage;

cout << fixed << showpoint << setprecision(2);

do

{

cout << endl << endl;

cout << "Hot Beverage Menu" << endl << endl; cout << "A: Coffee $1.00" << endl; cout << "B: Tea $ .75" << endl; cout << "C: Hot Chocolate $1.25" << endl;

cout << "D: Cappuccino $2.50" << endl << endl << endl;

cout << "Enter the beverage A,B,C, or D you desire" << endl;

cout << "Enter E to exit the program" << endl << endl;

**// Fill in the code to read in beverage**

switch(beverage)

{

case 'a':

case 'A':

case 'b':

case 'B':

case 'c':

case 'C':

case 'd':

case 'D': validBeverage = true;

break;

default: validBeverage = false;

}

if (validBeverage == true)

{

cout << "How many cups would you like?" << endl;

**// Fill in the code to read in number**

}

**// Fill in the code to begin a switch statement**

**// that is controlled by beverage**

{

case 'a':

case 'A': cost = number \* 1.0;

cout << "The total cost is $ " << cost << endl;

break;

**// Fill in the code to give the case for hot chocolate ($1.25 a cup)**

**// Fill in the code to give the case for tea ( $0.75 a cup)**

**// Fill in the code to give the case for cappuccino ($2.50 a cup)**

case 'e':

case 'E': cout << " Please come again" << endl;

break;

default:cout << **// Fill in the code to write a message**

**// indicating an invalid selection.**

cout << " Try again please" << endl;

}

} **// Fill in the code to finish the do-while statement with the**

**// condition that beverage does not equal E or e.**

**// Fill in the appropriate return statement**

}

1. Note that the inner loop of the following program is always executed exactly three times—once for each day of the long weekend. Modify the code so that the inner loop iterates *n* times, where *n* is a positive integer input by the user. In other words, let the user decide how many days to consider just as they choose how many students to consider.
2. Modify the program so that it also finds the average number of hours per day that a given student studies biology as well as programming. For each given student include two prompts, one for each subject. Have the program print out which subject the student, on average, spent the most time on.

#include <iostream>

using namespace std;

int main()

{

int numStudents;

float numHours, total, average;

int student,day = 0; // these are the counters for the loops

cout << "This program will find the average number of hours a day"

<< " that a student spent programming over a long weekend\n\n";

cout << "How many students are there ?" << endl << endl;

cin >> numStudents;

for(student = 1; student <= numStudents; student++)

{

total = 0;

for(day = 1; day <= 3; day++)

{

cout << "Please enter the number of hours worked by

student "

<< student <<" on day " << day << "." << endl;

cin >> numHours;

total = total + numHours;

}

average = total / 3;

cout << endl;

cout << "The average number of hours per day spent programming

by "

<< "student " << student << " is " << average

<< endl << endl << endl;

}

return 0;

}

1. In the following program comment on the marked line about what that statements does and also explain how the program operates.
2. Modify the program so that it gets number n as input from the user and generates n number random numbers and prints them as output.

#include <iostream>

#include <cstdlib>

#include <time.h>

using namespace std;

int main()

{

time\_t t;

/\*--------------------\*/

time(&t);

/\*--------------------\*/

srand((unsigned int) t);

/\*--------------------\*/

cout<<"The random number is "<<rand()<<endl;

cin.get();

return 0;

}