Tutorial letter 202/1/2018

Introduction to Programming I

COS1511

Semester 1

School of Computing

This tutorial letter contains the solutions for assignment 2

BAR CODE

Open Rubric

Dear Student

Your programs DO NOT HAVE TO BE IDENTICAL TO OURS, as long as you have followed the guidelines given in the questions, and got the same output for the given input data. You should have used good programming techniques.

In the Study Guide we introduced certain conventions, amongst others

- that names of variables and the names of functions should start with lowercase characters and further words in the names with uppercase characters,
- that the names of void functions should be verbs (or contain a verb) and
- that the names of value-returning functions should be nouns or adjectives.

Also

- use constants where needed
- avoid the use of global variables
- the correct indenting is extremely important
- remember to include comments

Below the mark allocation.

Question 1a	5
Question 1b	6
Question 1c	5
Question 1d	10
Question 2a	10
Question 2b	10
Question 2c	10
Question 3/4a	8
Question 4b	2
Question 5a	10
Question 5b	5
Question 5c	5
Question 6	14
Total	100

To send an e-mail, please use the Course Contact on *my*Unisa.

Best wishes.

Question 1 — 26

Question 1a

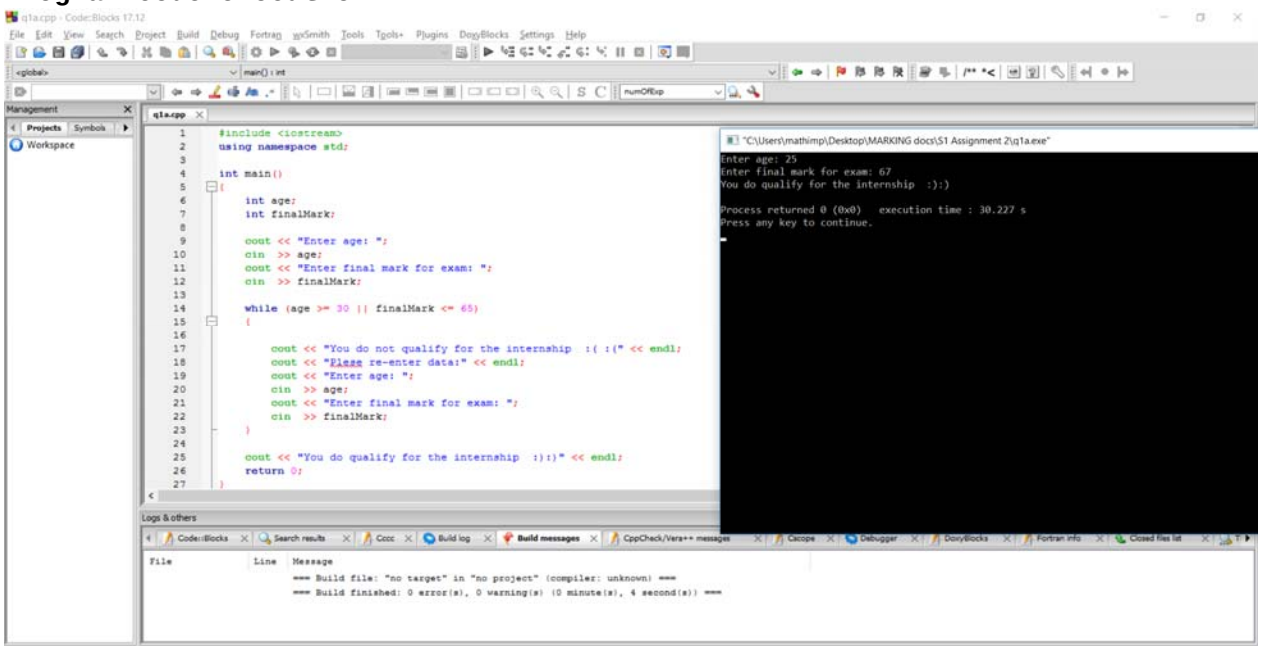
Suppose we want to input and validate the age of students that qualify for an internship, as well as the final mark obtained for the examination, in a `while` loop. To qualify, the student should be younger than 30 with a final mark of more than 65%. Read in values until a suitable candidate is found. Display appropriate messages, whether successful or not. The variable names are `age` and `finalMark` respectively. Complete the `while` loop below. You only have to write down the completed `while` loop.

Answer:

```
while (age >= 30 || finalMark <= 65)
    {
        cout << "You do not qualify for the internship  :( :(" << endl;
        cout << "Please re-enter data:" << endl;
        cout << "Enter age: ";
        cin  >> age;
        cout << "Enter final mark for exam: ";
        cin  >> finalMark;
    }
```

5

Program code execution:



Question 1b

State what output, if any, results from each of the following statement by first working it out on paper and then including it is a program. Submit a completed table as below: **Redraw table in Microsoft word** and submit completed table.

Answer:

	CODE	OUTPUT

example	`for (int i = 0; i < 10; i++)`
	`  cout << i;`
	`cout << endl;`
		`0123456789`

a.	`for (int i = 1; i <= 1; i++)`
	`  cout << "*";`
	`cout << endl;`
		`*` ✓

b.	`for (int i = 2; i >= 2; i++)`
	`  cout << "*";`
	`cout << endl;`
		`Infinite loop` ✓

c.	`for (int i = 1; i <= 1; i--)`
	`  cout << "*";`
	`cout << endl;`
		`Infinite loop` ✓

d.	`for (int = 12; i >= 9; i--)`
	`cout << "*";`
	`cout << endl;`
		Error ✓
		OR
		`****`
		There is no curly bracket after the for loop. Therefore, all the asterisks will print on the same line, if the variable `i` is added.

e.	`for (int i = 0; i <= 5; i++)`
	`cout << "*";`
	`cout << endl;`
		`******` ✓
		There is no curly bracket after the for loop. Therefore, all the asterisks will print on the same line.

f.	`for (int i = 1; i <= 5; i++)`
	`cout << "*";`
	`i = i + 1;`
	`cout << endl;`
		Compiler error. ✓
		The variable i is declared inside the for loop, so it is not accessible on the line i = i + 1;
		Hence on this line the compiler will throw an error. Note that there is no curly bracket after the 'for' loop; the loop has only one statement.

6

Question 1c

Include the `for` loop below in a small program and complete the program. The loop should be executed 10 times. Do not change the `for` loop below. Compile and run your program to see for yourself that it works. You do not have to submit this program and output.

```
for (int i = 0; i <= n; i++)
     if (i < 5 && i != 2)
          cout << 'X';
```

Now convert the `for` loop into a `while` loop and add any variable initialisations that you think are necessary. Compile and run your program. Submit only the program containing the while loop and its output.

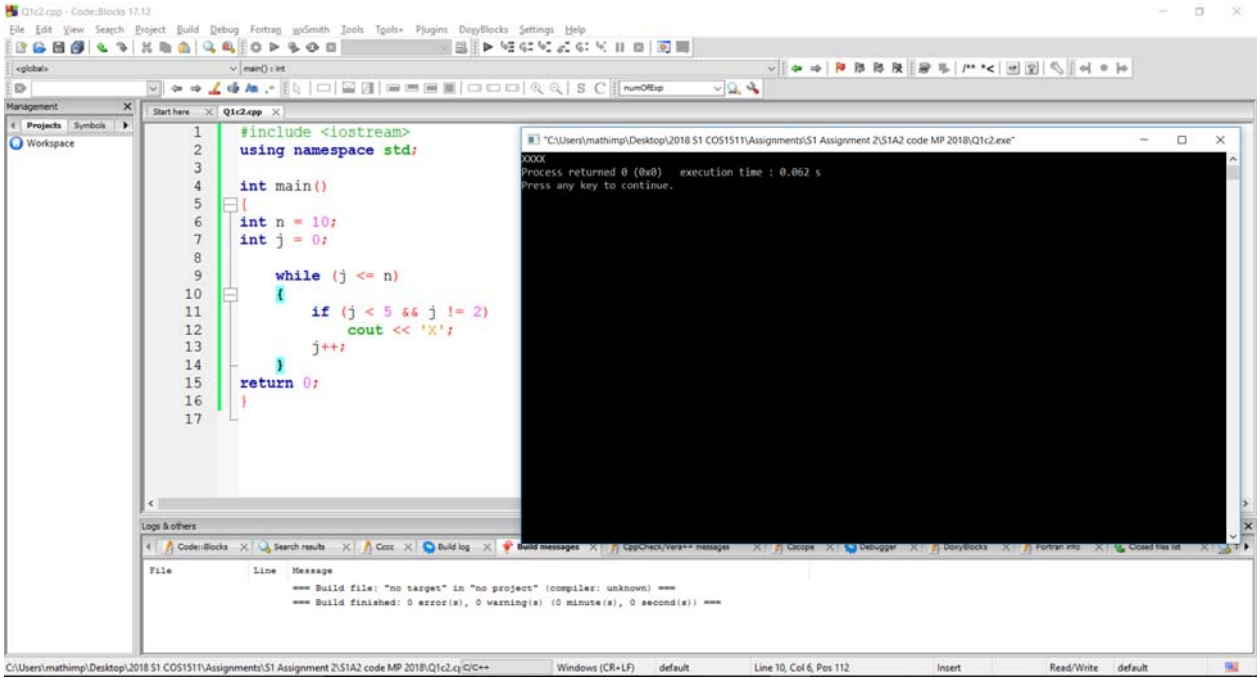
Answer:

The given loop executes 11 times.
If `j` starts at 0 and if the condition is `<= n`, then the loop will execute eleven times.
Since the question itself was given wrong, this can stay I suppose.

```
#include <iostream>
using namespace std;

int main()
{
int n = 10;
int j = 0;

    while (j <= n)
    {
        if (j < 5 && j != 2)
            cout << 'X';
        j++;
    }
return 0;
}
```

5

Program code execution:



Question 1d

When running the program given, it is supposed to give the output below. However, the program contains errors that prevent it from compiling and/or running. Correct the program so that it works properly.

The output:

```
Please enter 10 integers, positive, negative, or zeros. The
numbers you entered are:
2
7
-4
-3
0
7
4
0
-9
-4

There are 6 evens, which includes 2 zeros. The
number of odd numbers is: 4
```

The program:

```
#include <iostream>
using namespace std;

const int LIMIT = 10;

int main ()
{
     float counter;
     int number;

     int   zeros;
     int    odds;
     int evens;

     cout << "Please enter " << Limit << " integers, "
          << "positive, negative, or zeros." << endl;

     cout << "The numbers you entered are:" << endl;

     for (counter = 1; counter <= LIMIT; counter++)
     {
          cin << number;

          switch (number / 2)
          {
               case 0:
                    evens++;
                        if (number = 0)
                        zeros++;
```

```
                case 1:
                    case -1:
                    odds++;
            }
        }

        cout << endl;

        cout << "There are " << evens << " evens, "
             << "which includes " << zeros << " zeros."
             << endl;
        cout << "The number of odd numbers is: " << odds
             << endl;

        return 0;
 }
```

Submit only the program, not the output.

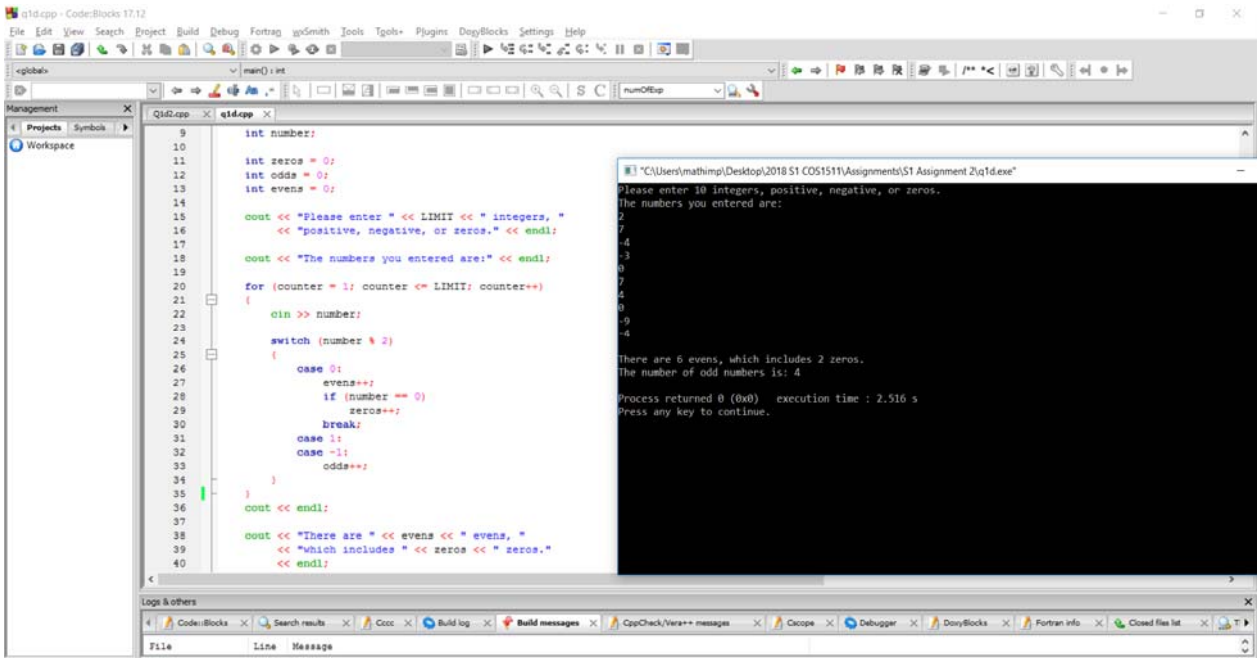
Answer:

```
#include <iostream>
using namespace std;

const int LIMIT = 10;

int main ()
{
    int counter;
    int number;

    int zeros = 0;
    int odds = 0;
    int evens = 0;

    cout << "Please enter " << LIMIT << " integers, "
         << "positive, negative, or zeros." << endl;

    cout << "The numbers you entered are:" << endl;

    for (counter = 1; counter <= LIMIT; counter++)
    {
        cin >> number;

        switch (number % 2)
        {
            case 0:
                  evens++;
                  if (number == 0)
                  zeros++;
              break;
            case 1:
```

10

```
            case -1:
            odds++;
        }
    }
    cout << endl;

    cout << "There are " << evens << " evens, "
         << "which includes " << zeros << " zeros."
         << endl;
    cout << "The number of odd numbers is: " << odds
         << endl;

    return 0;
}
```

Program code execution:

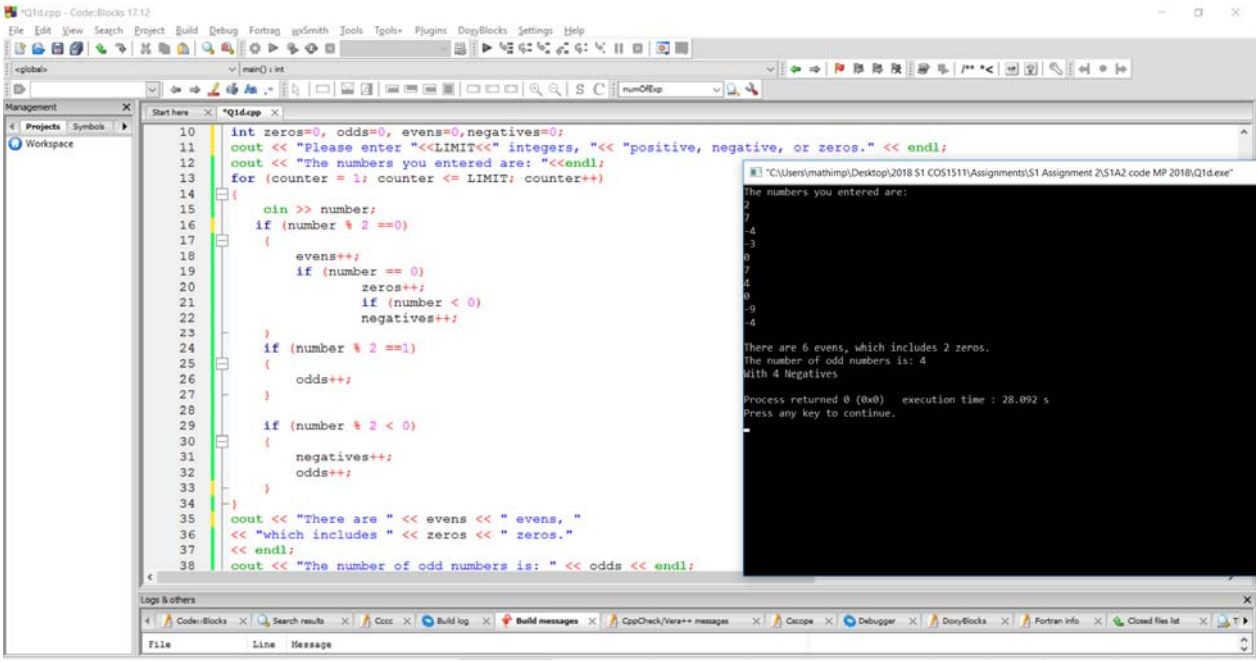


Alternative Answer using IF statements:

```
#include <iostream>
using namespace std;

const int LIMIT = 10;

int main ()
```

```
{
float counter;
int number;
int zeros=0, odds=0, evens=0,negatives=0;
cout << "Please enter "<<LIMIT<<" integers, "<< "positive, negative, or zeros." <<
endl;
cout << "The numbers you entered are: "<<endl;
for (counter = 1; counter <= LIMIT; counter++)
{
    cin >> number;
   if (number % 2 ==0)
    {
        evens++;
        if (number == 0)
                zeros++;
                if (number < 0)
                negatives++;
    }
    else if (number % 2 ==1)
    {
        odds++;
    }

    else if (number % 2 < 0)
    {
        negatives++;
        odds++;
    }
}
cout << "There are " << evens << " evens, "
<< "which includes " << zeros << " zeros."
<< endl;
cout << "The number of odd numbers is: " << odds << endl;
cout << "With "<< negatives <<" Negatives"<<endl;

return 0;
}
```

Program code execution:



QUESTION 2:	**30**

In this question, we describe the problem and then you have to decide yourself how you are going to tackle it.

Question 2a

The cost of renting a room at a hotel is R900 per night. For special occasions, such as a wedding or conference, the hotel offers a special discount as follows:

- if the number of rooms booked is at least 10, the discount is 10%;
- if the number of rooms booked is at least 20, the discount is 20%;
- if the number of rooms booked is greater or equal 30, the discount is 30%;

In addition, if rooms are booked for at least three days, there is an additional 5% discount.

Write a program that prompts the user to enter the cost of renting one room, the number of rooms booked, the number of days the rooms are booked and the sales tax (as a percent).

Display the output as follows:

```
Please enter the following:
              cost per room: 1000
         sales tax per room: 10
        the number of rooms: 35
             number of days: 2

The total cost for one room is R1000
The discount per room is 30% The
number of rooms booked: 35
The total cost of the rooms are R: 4900
The sales tax paid is: 10%
The total cost per booking is R53900
```

Submit a printout of the program and output.

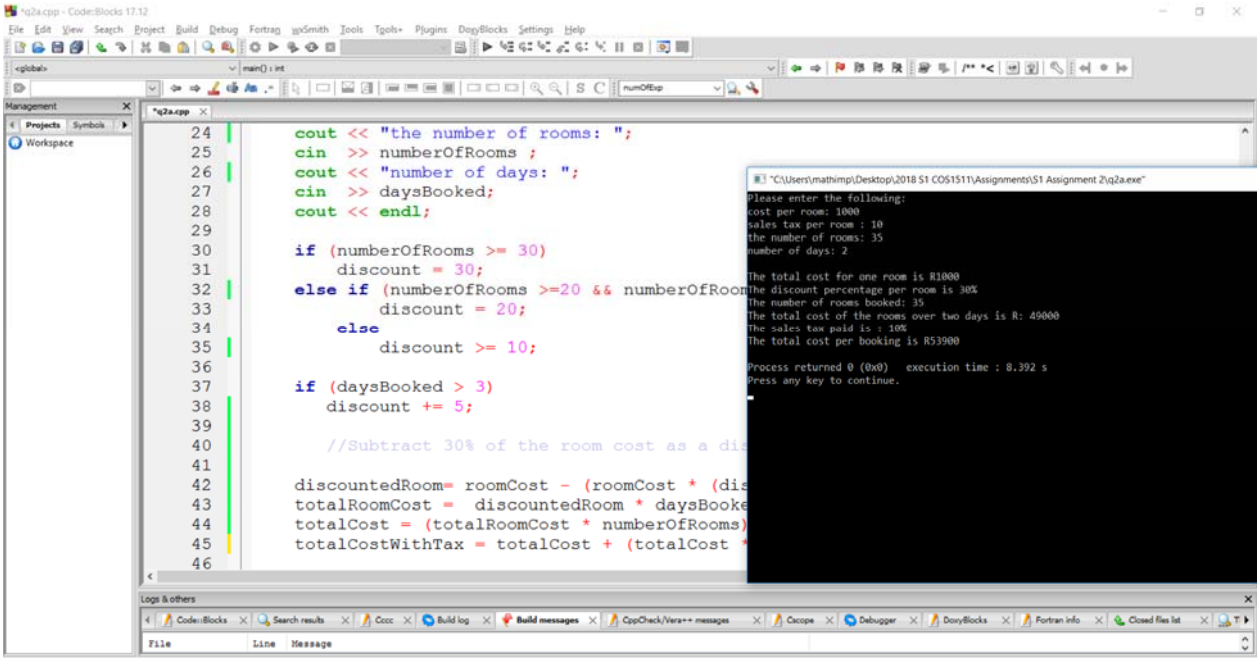
Answer:

```
#include <iostream>
using namespace std;


int main ()
{
    float roomCost;
    float salesTax;
    float totalCost = 0;
    int numberOfRooms;
    int daysBooked;
    float discount;

    float totalRoomCost;
    float totalCostWithTax;
    float discountCalc=0;
    float discountedRoom;

    cout << "Please enter the following:" << endl;
    cout << "cost per room: ";
    cin  >> roomCost;
    cout << "sales tax per room: ";
    cin  >> salesTax;
    cout << "the number of rooms: ";
    cin  >> numberOfRooms ;
    cout << "number of days: ";
    cin  >> daysBooked;
    cout << endl;

    if (numberOfRooms >= 30)
        discount = 30;
    else if (numberOfRooms >= 20)
            discount = 20;
    else if(numberOfRooms >= 10)
            discount = 10;

    else discount = 0;
    if ((daysBooked >= 3) && (numberOfRooms >= 10))
       discount += 5;
```

10

```
        //Subtract 30% of the room cost as a discount calculation

    discountedRoom= roomCost - (roomCost * (discount/100) );
    totalRoomCost =  discountedRoom * daysBooked;
    totalCost = (totalRoomCost * numberOfRooms);
    totalCostWithTax = totalCost + (totalCost * (salesTax/100));

    cout << "The total cost for one room is R" << roomCost << endl;
    cout << "The discount percentage per room is " << discount << "%" << endl;
    cout << "The number of rooms booked: " << numberOfRooms << endl;

    cout << "The total cost of the rooms over two days is R: " << totalCost << endl;
    cout << "The sales tax paid is: " << salesTax <<  "%" << endl;
    cout << "The total cost per booking is R" << totalCostWithTax << endl;

    return 0;
}
```

Program code execution:



Question 2b

Four experiments are performed, each consisting of five test results. The results for each experiment are given in the following list. Write a program using a nested loop to compute and display the average of the test results for each experiment. Display the average with a precision of two digits after the decimal point.

1st experiment results:	23.2	31	16.9	27	25.4
2nd experiment results:	34.8	45.2	27.9	36.8	33.4
3rd experiment results:	19.4	16.8	10.2	20.8	18.9
4th experiment results:	36.9	39	49.2	45.1	42.7

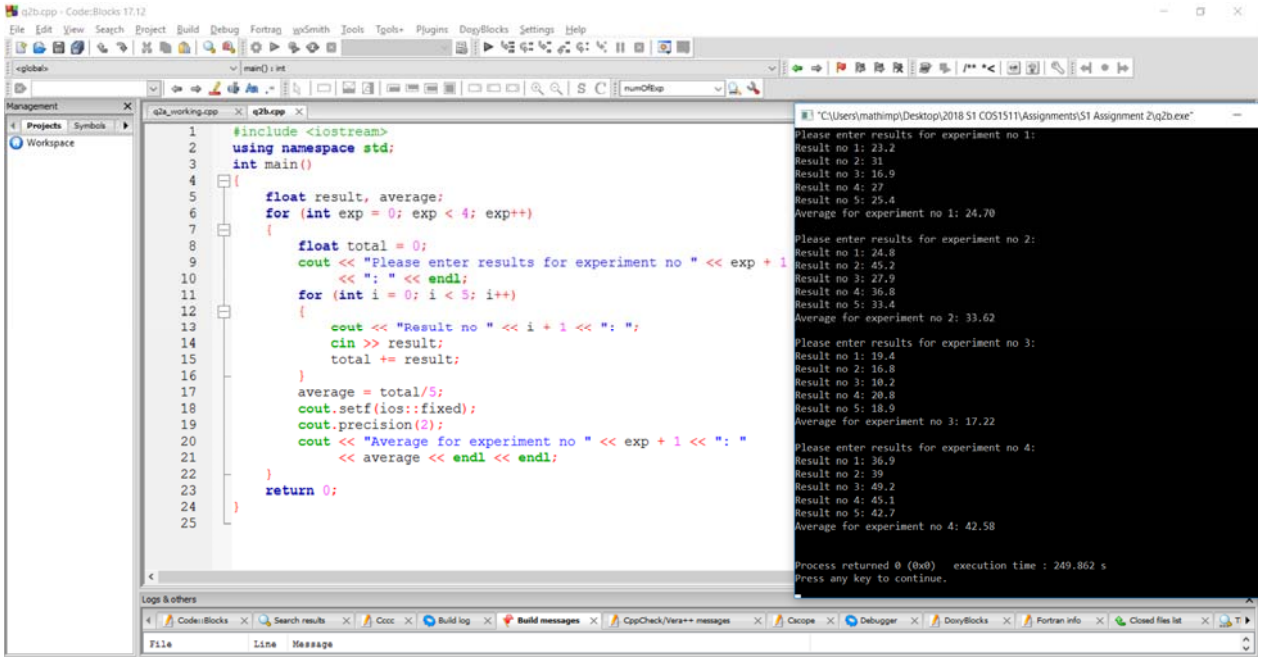
Use the input provided in the given list and execute the program.
Submit a printout of the program and output.

Answer:

```
#include <iostream>
using namespace std;
int main()
{
    float result, average;
    for (int exp = 0; exp < 4; exp++)
    {
        float total = 0;
        cout << "Please enter results for experiment no " << exp + 1
             << ": " << endl;
        for (int i = 0; i < 5; i++)
        {
            cout << "Result no " << i + 1 << ": ";
            cin >> result;
            total += result;
        }
        average = total/5;
        cout.setf(ios::fixed);
        cout.precision(2);
        cout << "Average for experiment no " << exp + 1 << ": "
             << average << endl << endl;
    }
    return 0;
}
```

10

Program code execution:



Question 2c

In this program, you have to make use of the `switch` statement.

The average life expectancy (in hours) of a lightbulb based on the bulb's wattage is listed in the table below:

Watts	Life expectancy (hours)
25	25000
40	1000
60	1000
75	750
100	750

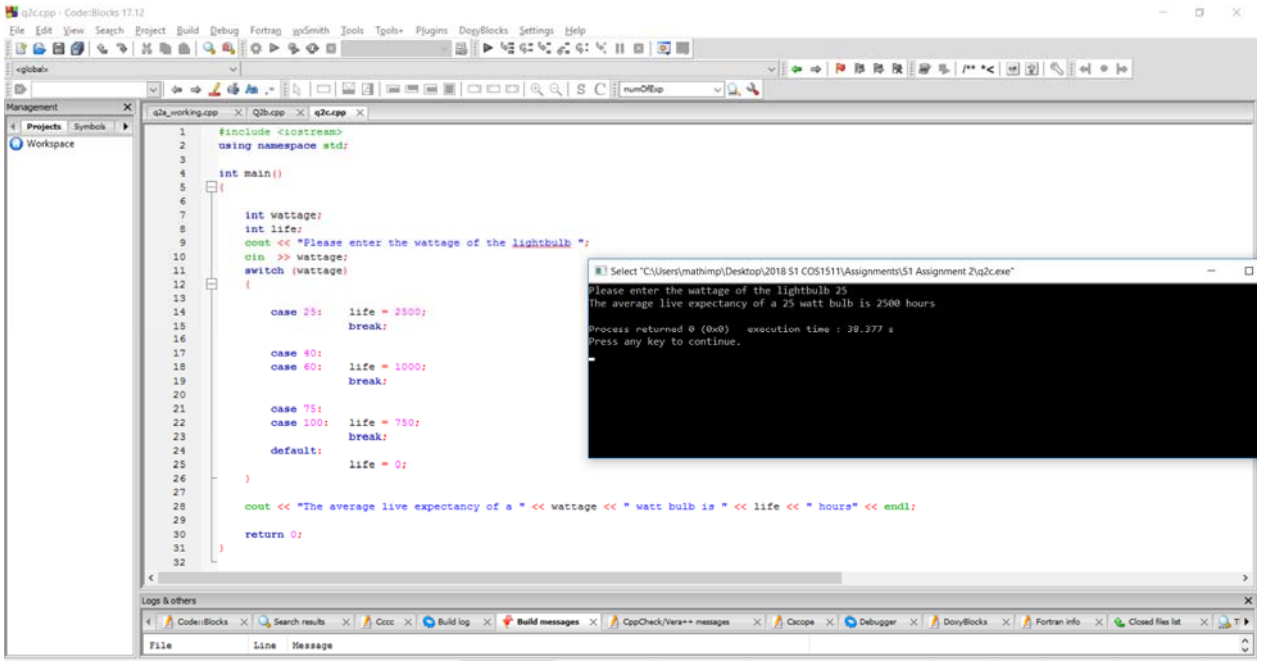
Write a program that when given a bulb's wattage, displays the average life expectancy. Submit a printout of the program and output.

Answer:

```
#include <iostream>
using namespace std;
int main()
{
    int wattage;
    int life;
    cout << "Please enter the wattage of the lightbulb ";
    cin >> wattage;
    switch (wattage)
    {
        case 25:    life = 25000;
                    break;
        case 40:
        case 60:    life = 1000;
                    break;
        case 75:
        case 100:   life = 750;
                    break;
        default:
                    life = 0;
    }
   cout << "The average life expectancy of a " << wattage << " watt bulb is " << life
<< " hours" << endl;
return 0;
}
```

10

Program code execution:



Question 3 & 4:	**10**

The Golden Sales Company pays it salespeople R12.50 for each item they sell. Given the number of items sold by a salesperson, your program should first print a heading, then calculate, and print the amount of pay due.

A function named `printHeading` (with no parameters) displays the following message:

```
**************************************************
                ** GOLDEN SALES COMPANY
This program inputs the number of items sold by a
Salesperson and prints the amount of pay due.
**************************************************
```

Another function, `calculatePay` displays the amount pay due to a salesperson. The function multiples the number of items sold with 12.50 to compute the pay to be paid out. The function has one value parameter items representing the number of items sold by a salesperson.

A main program inputs an integer value (`items`). It displays the description of the program by calling the function `printHeading`. The program then calls the function `calculatePay` to calculate and display the amount of pay due.

Sample run:

```
**************************************************
                ** GOLDEN SALES COMPANY
This program inputs the number of items sold by a
Salesperson and prints the amount of pay due.
**************************************************
** Please input the number of items sold
125
The amount pay due is R 1562.50
```

Question 4a

Write the functions `printHeading` and `calculatePay` as well as the main program. Submit a printout of the program and output.

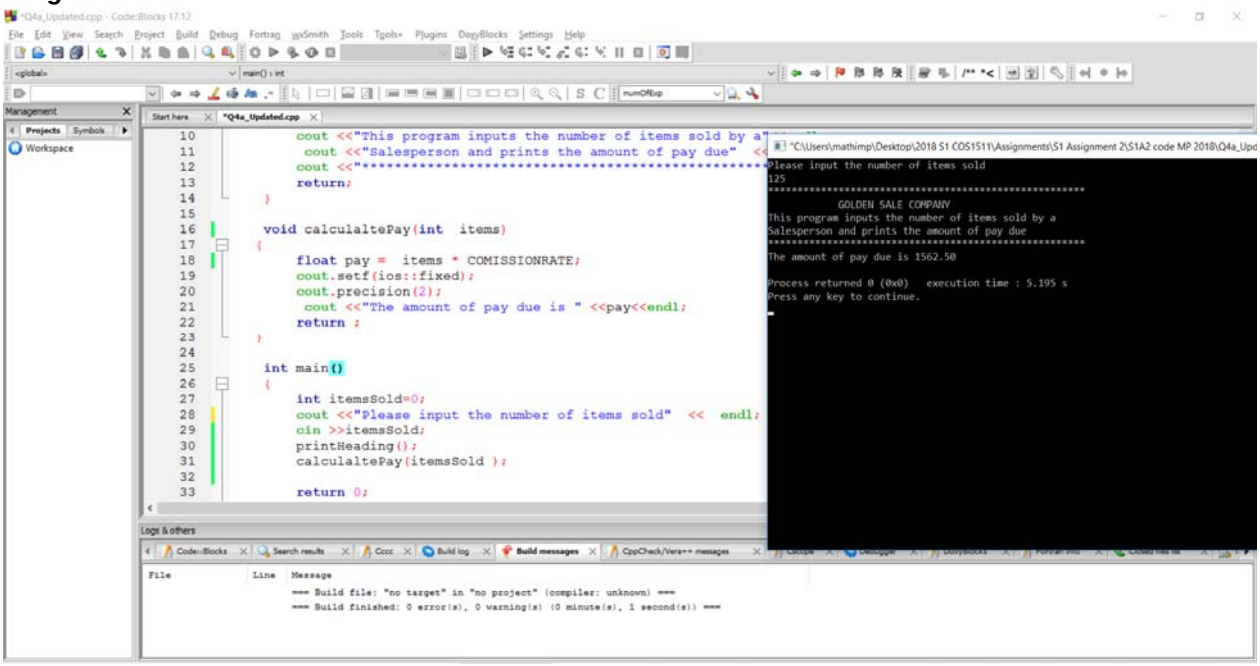
Answer (labelled 4a):

```
#include <iostream>
using  namespace std;
    const float COMISSIONRATE =12.50;
    void printHeading()
    {
        cout <<"*************************************************"  <<  endl;
        cout <<"            GOLDEN SALE COMPANY              "  <<  endl;
        cout <<"This program inputs the number of items sold by a"<<endl;
         cout <<"Salesperson and prints the amount of pay due"  <<  endl;
        cout <<"*************************************************"  <<  endl;
        return;
    }
    void calculaltePay(int  items)
   {
        float pay =  items * COMISSIONRATE;
        cout.setf(ios::fixed);
        cout.precision(2);
         cout <<"The amount of pay due is " <<pay<<endl;
        return ;
   }
      int main()
      {
          int itemsSold=0;
          cout <<"Please input the number of items sold"  <<  endl;
          cin >>itemsSold;
          printHeading();
```

8

```
        calculaltePay(itemsSold );

    return 0;

}
```

Program code execution:



Question 4b

Change the program so that the pay amount is displayed in the main program instead of function `calculatePay.` Submit a printout of the program and the output.

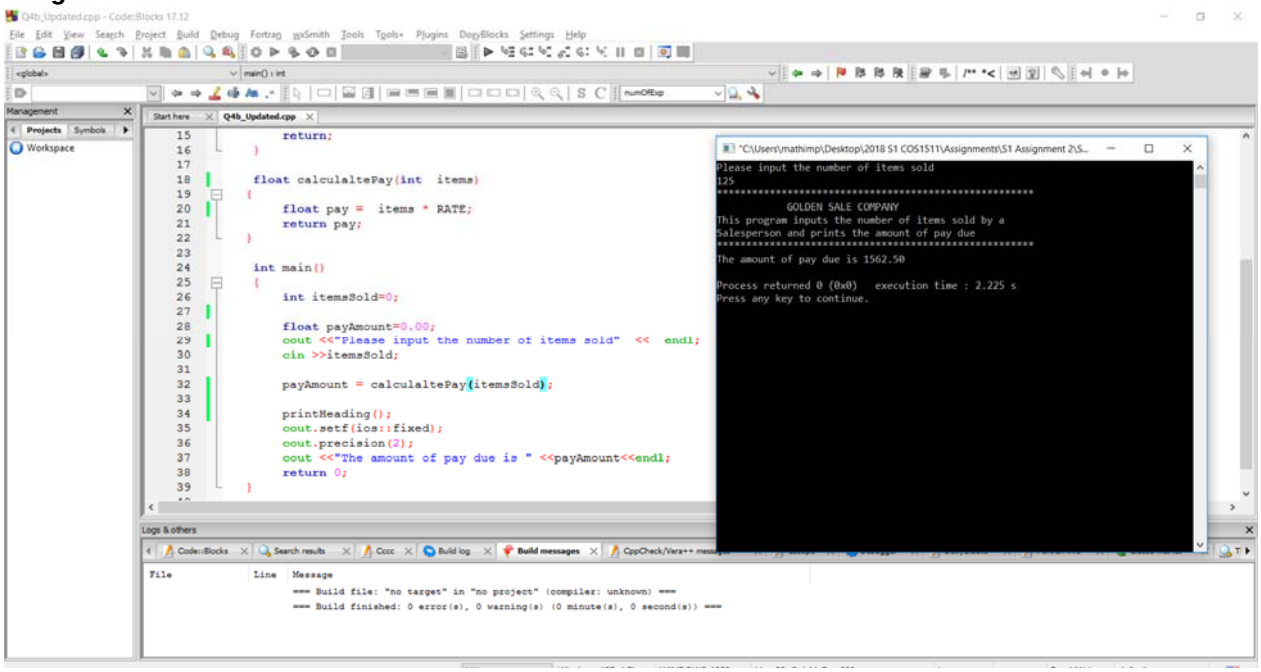
Answer:

```
#include <iostream>
//# include<iomanip>
      using  namespace std;

    const float RATE = 12.50;


    void printHeading()
    {
        cout <<"*****************************************************"  <<  endl;
        cout <<"            GOLDEN SALE COMPANY                "  <<  endl;
        cout <<"This program inputs the number of items sold by a"<<endl;
         cout <<"Salesperson and prints the amount of pay due"  <<  endl;
        cout <<"*****************************************************"  <<  endl;
```

```
        return;
    }

    float calculaltePay(int  items)
{
        float pay =  items * RATE;
        return pay;
}
    int main()
    {
        int itemsSold=0;

        float payAmount=0.00;
        cout <<"Please input the number of items sold"  <<  endl;
        cin >>itemsSold;

        payAmount = calculaltePay(itemsSold);

      printHeading();
        cout.setf(ios::fixed);
      cout.precision(2);
      cout <<"The amount of pay due is " <<payAmount<<endl;
    return 0;
}
```

2

Program code execution:



QUESTION 5:	20

Question 5a

Write a function named `integerPower()` that accepts two integer numbers (`base` and `exponent`) as formal parameters and returns the value of base ^{exponent}. For example,

```
integerPower(3,4) = 3 * 3 * 3 * 3 =81
```

The function `integerPower()` should use a `for` or `while` loop to do the calculation. (Do not use any math library functions.)

Include the `integerPower()` function in a working program. Again, the `main()` function should input the values, correctly call `integerPower()` and display the value returned by the function, all with appropriate messages.

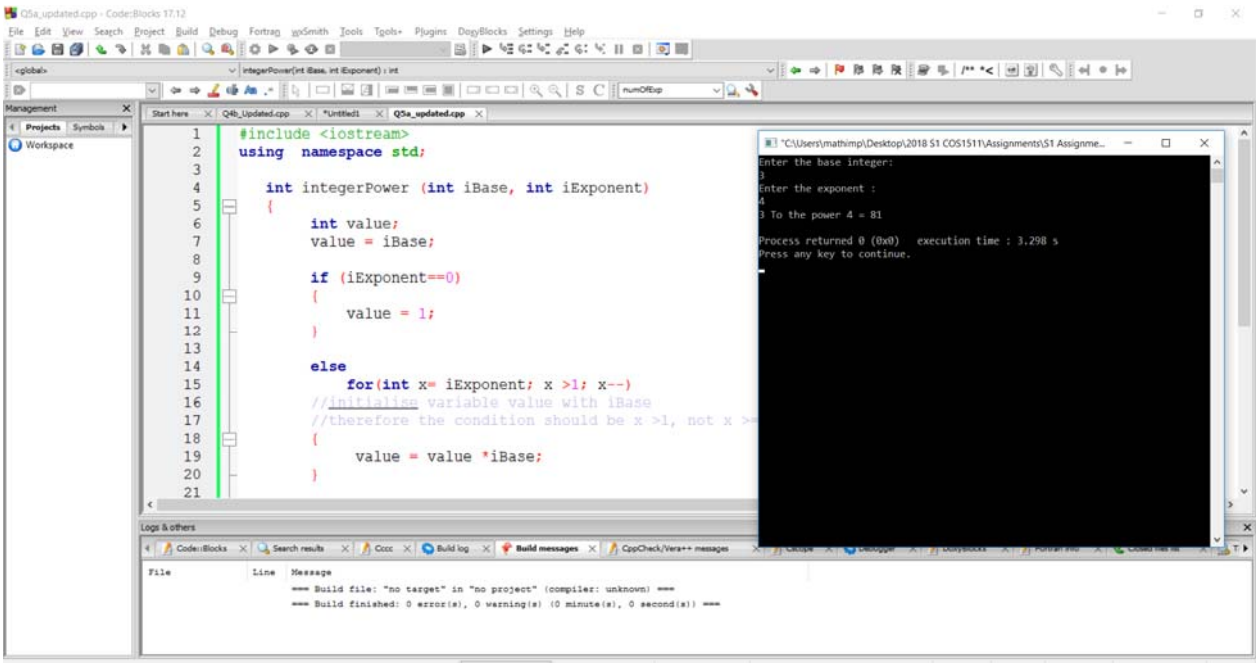
Answer:

```
#include <iostream>
using  namespace std;

   int integerPower (int iBase, int iExponent)
   {
        int value;
        value = iBase;

        if (iExponent==0)
        {
            value = 1;
        }

        else
            for(int x= iExponent; x >1; x--)
            //initialised variable value with iBase
            //therefore the condition should be x >1, not x >= 1
        {
             value = value *iBase;
        }

    return value;
   }

   int main()
   {
        int base,  exponent, result;
        cout      << "Enter the base integer:"<<endl;
        cin       >> base;
        cout      << "Enter the exponent :" << endl;
        cin       >> exponent;
```

10

```
        result = integerPower(base, exponent);
        cout      << base << " To the power "<< exponent<<" = "<<result     <<endl;

        return 0;
    }
```

Program code execution:



Question 5b

Write a function named `isEqual()` that accepts two `char` values as formal parameters and returns TRUE if the characters are the same otherwise FALSE.

Include the `isEqual()` function in a working program. The `main()` function should input the values, correctly call `isEqual()` and display the value returned by the function, all with appropriate messages. Submit a printout of the program and output.

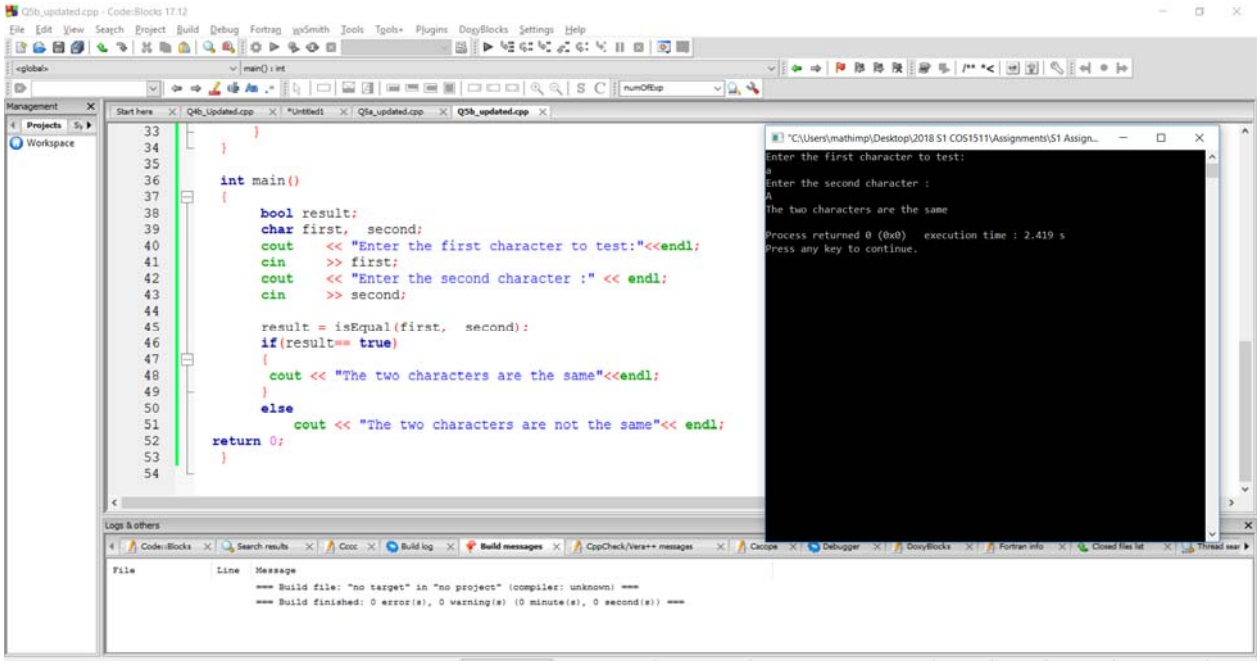
Answer (Students do not have to cater for upper case and lower case- it was not stated in the question):

```
#include <iostream>
using  namespace std;

 bool isEqual (char  inFirst,  char inSecond)
{
    string trueValue;
```

```
  int lower, upper;

  //lower and uppercase values
  lower = inFirst -32;
  upper= inFirst + 32;

  if (inFirst==inSecond)
     {
         //exact match
        return true;
      }

    else if (lower ==inSecond)
     {
        //lowercase value
        return true;
      }

     else if ( upper ==inSecond)
     {
        return true;
      }

    else
     {
      return false;
     }
 }

 int main()
 {
      bool result;
      char first,  second;
      cout      << "Enter the first character to test:"<<endl;
      cin       >> first;
      cout      << "Enter the second character :" << endl;
      cin       >> second;

      result = isEqual(first,  second);
      if(result== true)
      {
       cout << "The two characters are the same"<<endl;
      }
      else
          cout << "The two characters are not the same"<< endl;
return 0;
 }
```

5

Program code execution:



Question 5c

Write a function named `twice()` that accepts two `integer` values as formal parameters. The function then multiplies each parameter with 2 which is returned to the calling program.

Include the `twice()` function in a working program. The `main()` function should input the values, correctly call `twice()` and display the values returned by the function, all with appropriate messages. Submit a printout of the program and output.

Answer:

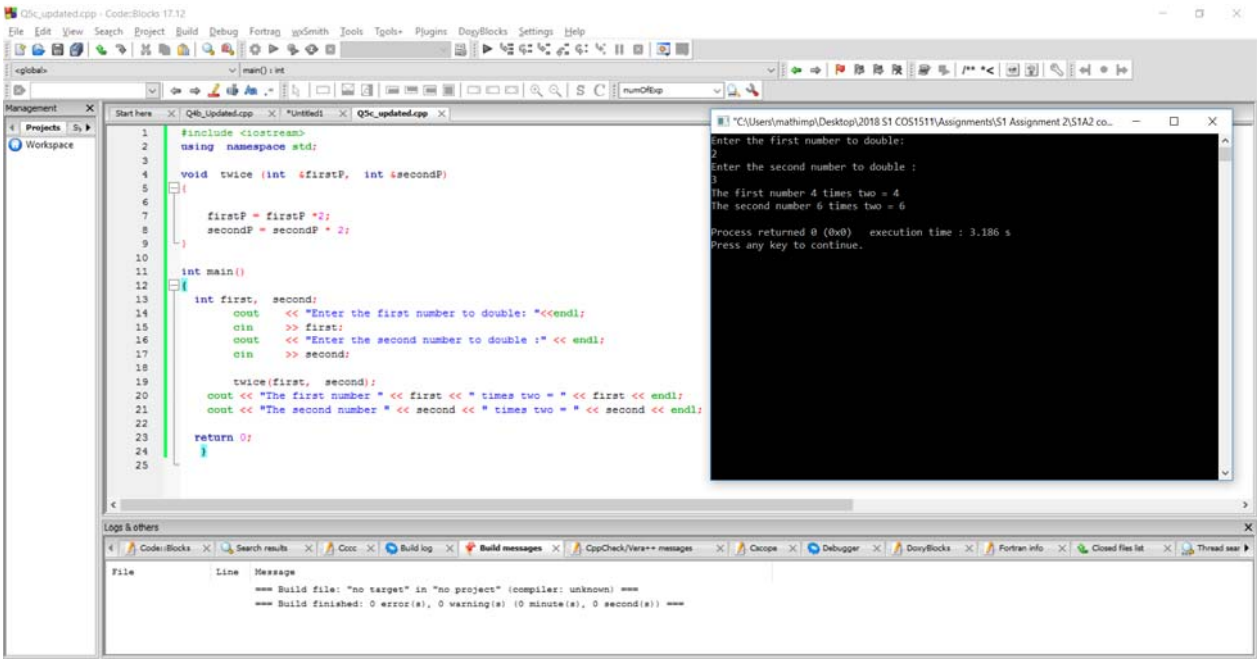
A function can return only one value using a single return statement. Here we have to return two values; therefore, we have to use reference parameters (&) to accomplish the task.

```
#include <iostream>
using  namespace std;

void  twice (int  &firstP,  int &secondP)
{

    firstP = firstP *2;
    secondP = secondP * 2;
}

int main()
{
  int first,  second;
```

5

```
        cout      << "Enter the first number to double: "<<endl;
        cin       >> first;
        cout      << "Enter the second number to double :" << endl;
        cin       >> second;

        twice(first,  second);
      cout << "The first number " << first << " times two = " << first << endl;
      cout << "The second number " << second << " times two = " << second << endl;

  return 0;
   }
```

Program code execution:



QUESTION 6: **14**

A particular talent competition has 5 judges, each of whom awards a score between 0 and 10 to each performer. Fractional scores, such as 8.3, are allowed. A performer's final score is determined by dropping the highest and lowest score received, then averaging the 3 remaining scores. Write a program that uses this method to calculate a contestant's score. It should include the following functions:

a) A function that asks the user for a judge's score, store it in a reference parameter variable, and validate it. This function should be called by main once for each of the 5 judges. Do not accept judge scores lower than 0 or higher than 10.

b) A function to calculate and display the average of the 3 scores that remain after dropping the highest and lowest scores the performer received. This function should be called just once by main, and should be passed the 5 scores. The two functions, described below, should be called by this function, which uses the returned information, to determine which of the scores to drop.

c) A function to find and return the lowest of the 5 scores passed to it.
d) A function to find and return the highest of the 5 scores passed to it. e) A function to display the output.

The main function is given below. Implement the functions you have developed and execute the program using the following data:

12 12 y	24 4 Y	23 15 y	4 8 y	15 59 N

```
#include <iostream>
using namespace std;

int main()
{
double score1, score2, score3, score4, score5;
// 5 judge's scores
double finalScore;

//  Call  getJudgeData  once  for  each  score  to  be  input
getJudgeData(score1);
getJudgeData(score2);
getJudgeData(score3);
getJudgeData(score4);
getJudgeData(score5);

// Call calcScore to calculate the contestant's final score

finalScore = calcScore(score1, score2, score3, score4, score5);

//          Display          output
displayOutput(finalScore ); return 0;

}// end of main function
```

Submit a printout of the functions and output.

Answer:

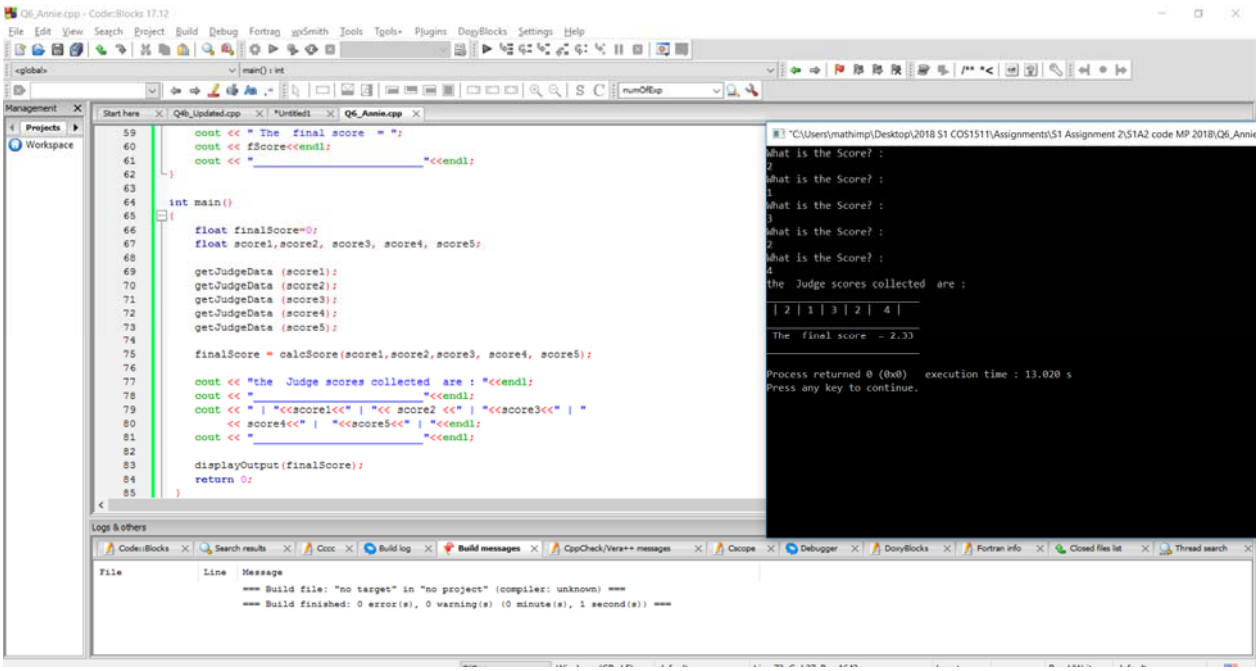
```
#include <iostream>
using  namespace std;

void  getJudgeData(float &score)
{
    cout << "What is the Score? : "<<endl;
    cin     >> score;
    while (score <0 || score > 10 )
    {
        cout << "invalid score. Please enter a score "
```

```
            << "value between 1 and 10? : " << endl;
        cin >> score;
    }
}
float findHigh(float  s1, float s2, float s3, float s4, float s5)
{
    float high = 0.0;
    if(s1 > high)
        high = s1;
    if(s2 > high)
        high = s2;
    if(s3 > high)
        high = s3;
    if(s4 > high)
        high = s4;
    if(s5 > high)
        high = s5;
    return high;
}
float findLow(float  s1, float s2, float s3, float s4, float s5)
{
    float low = s1;
    if(s2 < low)
        low = s2;
    if(s3 < low)
        low = s3;
    if(s4 < low)
        low = s4;
    if(s5 < low)
        low = s5;
    return low;
}

float  calcScore (float  s1, float s2, float s3, float s4, float s5)
{
    float highScore =0, lowScore =0, finalScore;

    highScore = findHigh(s1,s2,s3,s4,s5);
    lowScore = findLow(s1,s2,s3,s4,s5);

    finalScore = (s1+s2+s3+s4+s5 - highScore - lowScore)/3;

    return finalScore ;
}
void displayOutput(float fScore)
{
    cout.precision(2);
    cout.setf(ios::fixed);
    cout << " The  final score  = ";
    cout << fScore<<endl;
    cout << "_____________________________"<<endl;
}

int main()
{
    float finalScore=0;
```

14

```
    float score1,score2, score3, score4, score5;

    getJudgeData (score1);
    getJudgeData (score2);
    getJudgeData (score3);
    getJudgeData (score4);
    getJudgeData (score5);

    finalScore = calcScore(score1,score2,score3, score4, score5);

    cout << "the  Judge scores collected  are : "<<endl;
    cout << "_____________________________"<<endl;
    cout << " | "<<score1<<" | "<< score2 <<" | "<<score3<<" | "
         << score4<<" |  "<<score5<<" | "<<endl;
    cout << "_____________________________"<<endl;

    displayOutput(finalScore);
    return 0;
}
```

Program code execution:

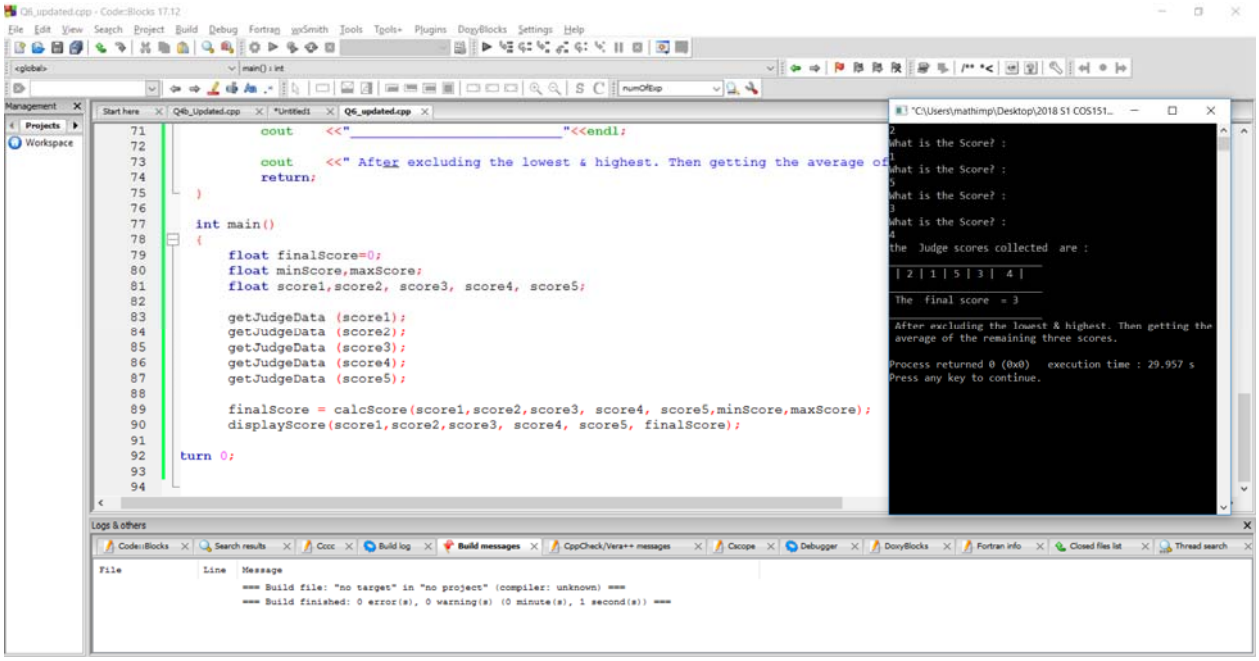


Alternative answer (using arrays to calculate the min and max):

```
#include <iostream>
using  namespace std;


    float  getJudgeData (float &score)
    {
        cout << "What is the Score? : "<<endl;
        cin >> score;
        while (score <0 || score > 10 )
        {
            cout << "invalid score. Please enter a score value between 1 and   10 :
"<<endl;
            cin   >> score;
        }
    }

    void calcMinMax(float mScore1, float mScore2, float mScore3, float mScore4 ,
float mScore5,float &lowScore, float &highScore)
    {
        lowScore=0;
        highScore =0;
        float ave = 0;
        int numJudges = 5;
        int scoreArray[5];

        //allocate the array values
        scoreArray[0]= mScore1;
        scoreArray[1]= mScore2;
        scoreArray[2]= mScore3;
        scoreArray[3]= mScore4;
        scoreArray[4]= mScore5;
        highScore = 0;
        lowScore =scoreArray[0];
        highScore=scoreArray[0];

        //calculate the Max and min

        for (int i=0; i <5; i++)
        {
            if (scoreArray[i] > highScore)
            {
                highScore =scoreArray[i];
            }
            else if (scoreArray[i] <lowScore)
            {
                lowScore =scoreArray[i];
            }
        }

    }
      float  calcScore (float  aScore,  float bScore,float cScore,float dScore,float
      eScore, float cMin, float cMax )
```

```
    {
        float ave=0.0;

        calcMinMax(aScore, bScore, cScore, dScore , eScore, cMin, cMax);

        ave= (aScore + bScore + cScore + dScore + eScore - cMax -  cMin)/3;

        return ave ;

    }

    void displayScore( float dScore1,float dScore2,float dScore3, float dScore4,
    float dScore5, float dFinalScore)
    {
            cout  << "the  Judge scores collected  are : "<<endl;
            cout    <<"_____________________________"<<endl;
            cout    <<" | "<< dScore1 <<" | "<< dScore2 <<" | "<< dScore3 <<" | "<<
            dScore4 <<" |  "<< dScore5 <<" | "<<endl;
            cout    <<"_____________________________"<<endl;

            cout    <<" The  final score  = ";
            cout    << dFinalScore <<endl;
            cout    <<"_____________________________"<<endl;

            cout     <<" After excluding the lowest & highest. Then getting the
            average of the remaining three scores."<<endl;
            return;
    }

      int main()
      {
            float finalScore=0;
            float minScore,maxScore;
            float score1,score2, score3, score4, score5;

            getJudgeData (score1);
            getJudgeData (score2);
            getJudgeData (score3);
            getJudgeData (score4);
            getJudgeData (score5);

            finalScore       =       calcScore(score1,score2,score3,       score4,
            score5,minScore,maxScore);
            displayScore(score1,score2,score3, score4, score5, finalScore);

return 0;
 }
```

Program code execution:



©
UNISA
2018

RESULTS

Questioin 1a = 5

Questioin 1b = 6

Questioin 1c = 5

Questioin 1d = 10

Questioin 2a = 10

Questioin 2b = 10

Questioin 2c = 10

Questioin 3 & 4a = 8

Questioin 4b = 2

Questioin 5a = 10

Questioin 5b = 5

Questioin 5c = 5

Questioin 6 = 14

Total = 100 / 100 (100%)

Finalize