CSC 155 *Computer Science I* LAB 5

Student Name _____ Section _____

Instructor _____ Due Date _____

Project	1	2	3	4	5	6	TOTAL
Maximum Points	2 points	2 points	2 points	2 points	1 point	1 point	10 points
Your Score							

PROJECT ONE (Papa Alex Pizza Parlor)

Objective To modify a program which simulates a pizza parlor's order entry interface.

PROJECT DESCRIPTION

The manager of Papa Alex Pizza Parlor would like you to modify their exiting program, which calculates customers' bills. Their current program, given in **Figure 2**, was written so that the user enters the data at the keyboard and the total bill is then displayed. Since, the time that the original program was written, Papa Alex has added a new personal size pizza (6 - inch) and a new extra large pizza (18 - inch) and they also have increased prices on their other size pizzas.

Their new pizza prices are listed below. Included are new prices for adding more toppings to the standard cheese base and new prices for adding extra cheese.

Size

6 - inch personal	$ 3.15
10 - inch small	$ 5.70
14 - inch medium	$ 7.45
16 - inch large	$ 9.15
18 - inch extra large	$ 11.15

Number of toppings

6 - inch personal	35 ¢ each
10 - inch small	55 ¢ each
14 - inch medium	70 ¢ each
16 - inch large	85 ¢ each
18 - inch extra large	$ 1.40 each

Extra cheese

6 or 10 inch	$ 1.10 extra
14 or 16 or 18 inch	$ 2.00 extra

In addition, a new 6.75 percent state sales tax must be added to the bill (the tax rate in the original program was 6 %).

A sample menu selection is given in the program output shown in **Figure 1**, which follows.

Information About This Project

This project uses a computer programming language to solve a business application.

The needed input data is the size, number of toppings, and a variable indicating whether extra cheese is requested. The only output variable required is the total bill.

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PROJECT ONE

Looking again at the project description, the program must accomplish five basic tasks:

(1) Display the pizza menu.
(2) Calculate the basic cost.
(3) Add the cost of extra cheese, if requested.
(4) Add 6.75 percent sales tax.
(5) Display the total bill.

Step **(2)** consists of four subsets:

(A) Prompt the user to enter the pizza size.
(B) Prompt the user to enter the number of toppings.
(C) Calculate the basic cost, depending on size.
(D) Add the cost of the toppings.

After the menu is displayed, input statements are used to obtain the size and the number of toppings. Since both the cost and the topping price vary depending on the size, this is an ideal situation for the `switch` case statement. We can determine the basic cost and the price for the toppings in the `switch` case statement. Next, the program must ask if extra cheese is desired. The user will need to enter yes or no (1 or 2) at this prompt. Because there are only two different charges, a block `if` will be used here. Once the tax is added, we will have the total bill. An output statement will be used to display this amount in monetary form.

Steps to Complete This Project

STEP 1 **Open Visual C++ and Modify the Program Code**

Open MS Visual C++ on you computer. Modify the program code in **Figure 2** that will allow the user to enter the necessary input items and then use these items to compute the required output value(s).

STEP 2 **Compile and Run your Program**

Run your program. Test the operation of your program using the sample run in **Figure 1**, which follows.

STEP 3 **Print your Program Code and your Run Time Output**

When completed, print your program source code as well as the sample program output(s). Attach the hardcopies to your lab cover sheet for credit.

Figure 1 **Sample Menu Selection - Papa Alex Pizza Parlor (Modified Program)**

```
Welcome to Papa Alex Pizza Parlor

1.     6 - inch personal pizza
2.    10 - inch small pizza
3.    14 - inch medium pizza
4.    16 - inch large pizza
5.    18 - inch extra large pizza

Enter the number (1-5) corresponding to the size pizza:  3
Enter the number of toppings:  2
Do you want extra cheese?
(enter 1 for Yes / enter 2 for No) 1

The total cost of your pizza is  $11.58
```

Figure 2 Papa Alex Pizza Parlor Code

```
#include <iostream>
#include <iomanip>
using namespace std;
void main()
{
  int extra, number, size;
  double charge, cheese, toppings, total;
  cout << "PAPA ALEX PIZZA PARLOR" << endl;
  cout << "----------------------\n" << endl;
  cout << "Please select a pizza size\n\n" << endl;
  cout << "Enter the number corresponding to the pizza size\n\n";
  cout << " 1  10-inch (small size)\n";
  cout << " 2  14-inch (medium size)\n";
  cout << " 3  16-inch (large size)\n\n";
  cin >> size;
  cout << "\nPlease enter the number of toppings\n\n";
  cin >> number;
  cout << "\nDo you want extra cheese?\n";
  cout << "(enter 1 for Yes / enter 2 for No)" << endl;
  cin >> extra;
  switch (size) {
    case 1 : //small size
      charge = 5.50;
      toppings = 0.50;
      cheese = 1.00;
      break;
    case 2 : //medium
      charge = 7.25;
      toppings = 0.65;
      cheese = 2.00;
      break;
    case 3 : //large size
      charge = 8.90;
      toppings = 0.75;
      cheese = 2.00;
      break;
  }
  if (extra == 1)
    total = charge + number * toppings + cheese;
  else
    total = charge + number * toppings;
  total = total * 1.06;
  setiosflags(ios::right);
  cout.setf(ios::fixed, ios::floatfield);
  cout << setprecision(2);
  cout << "\nThe total cost of your pizza is $" << total << endl;
  cout << "\n\nThank you for your order!\n" << endl;
}
```

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PROJECT TWO (Higgins Cable Television Corporation)

Objective To modify a program which simulates a cable television billing interface.

PROJECT DESCRIPTION

Higgins Cable Television Corporation needs a program to help with the billing of its customers. The user should be prompted to enter the due date for the bill, the customer's name and address, and the applicable charges based on the following list:

Standard service	$ 27.00
Cable service	$ 8.00
Home Cinema Channel	$ 12.00
The Captain's Cartoon Channel	$ 11.00

All customers receive the standard service. The program should print an itemized bill showing the total amount due and the amount owed for the late payment, which is the total plus 5 percent. Use your own test data. Your output should resemble the following:

Name:	Due Date:
Address:	
Services:	
Standard service	$ 27.00
Cable service	8.00
Home Cinema Channel	12.00
The Captain's Cartoon Channel	11.00
Total amount due:	$ 58.00
After due date:	$ 60.90

Information About This Project

This particular program illustrates business applications of programming procedures.

Steps To Complete This Project

STEP 1 **Open Visual C++ and Write the Program Code**

Open Visual C++ on you computer. Write the program code that will allow the user to enter the necessary input items and then use these items to compute the required output value(s).

STEP 2 **Compile and Run your Program**

Run your program. Test the operation of your program using appropriate numbers for your input variables.

STEP 3 **Print your Program Code and your Run Time Output**

When completed, print your program source code as well as the program output(s). Attach the hardcopies to your lab cover sheet for credit.

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PROJECT THREE (Prime Number Tester)

Objective To utilize a program that tests whether or not a given positive integer is a prime number.

PROJECT DESCRIPTION

A prime number is a positive integer, which is divisible by itself and the number one only.

Write, compile and execute a program, which accepts a user - input positive integer and then determines whether the number is prime.

If the user inputs the number 1 , then your program should display the message: " 1 is not a prime number".

Information About This Project

A prime number is a positive integer, which is divisible by itself and the one only. The set of prime numbers is described by the following set:

{ 2 , 3 , 5 , 7 , 11 , 13 , 17 , 19 , 23 , . . . }

Notice that the number 1 itself is not considered to be a prime number.

Steps To Complete This Project

Type the program code shown in **Figure 1**, which follows.
Once you have tested and run your program successfully, then determine if the following numbers are prime or not prime. Enter your answers in the spaces provided below.
Once your program has compiled correctly, attach a printout of your source code along with a sample run your program.

Determine whether or not the following numbers are prime. For each number, enter a √ in the appropriate column.

Number to be tested		**√ if prime**	**√ if not prime**
53			
257			
1,999			
2,607			
3,313			

Figure 1 Program Code for the Prime Number Tester

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

void main()
{
  char answer;
  double n;
  int i;

  do
  {
    cout << "What is the number to be tested? ";
    cin >> n;

    if(int(n) != n)
    {
      cout << "n is not an integer" << endl;
      goto again;
    }
    if(n <= 1)
    {
      cout << "enter a number more than 1" << endl;
      goto again;
    }

    for(i = 2; i <= n - 1; i++)
      if(int(n / i) == (n / i)) goto not;
        cout << n << " is a prime number" << endl; goto again;
not:    cout << n << " is not a prime number" << endl;
again:  cout << "\ntest another number? (Y for Yes/N for No)\n";
    cin >> answer;
  }while( answer == 'Y' || answer == 'y');
}
```

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PROJECT FOUR (Weighted Average Program)

Objective To compute a weighted average.

PROJECT DESCRIPTION

Write a program that determines the final course average for the following student. The student's scores for each of Test 1 , the Midterm, the Final and the class Project are included in **Figure 1** below.

The final course average is computed by multiplying each individual score by the associated weight (percent) of the score and then adding these products to arrive at this average. Test 1 is worth 15 % towards the final course average, the Midterm is worth 20 % towards the final course average, the Final is worth 35 % and the class Project is worth 30 % .

Write your program such that the user is prompted to enter the student's ID and the student's individual scores for each of Test 1 , the Midterm, the Final and the class Project. Your program is then to display the message " the final course average is " and then display the actual final course amount, as an integer value.

Include your name, course information and date in the heading portion of your code. Submit both your program source code as well as the required program output.

Student ID	Test 1	Midterm	Final	Project
505	90	82	75	100

Figure 1 Student Scores

Information About This Project

The main parts of this program are:

Input Student ID, Test 1 score, Midterm score, Final Exam score, Project score

Process average = 15 % × Test 1 + 20 % × Midterm + 35 % × Final + 30 % × Project

Output display message: " the final course average is "
display value: average

Steps To Complete This Project

STEP 1 **Open Visual C++ and Write the Program Code**

Open Visual C++ on you computer. Write the program code that will allow the user to enter the necessary input items and then use these items to compute the required output value(s).

STEP 2 **Compile and Run your Program**

Run your program. Test the operation of your program using appropriate numbers for your input variables.

STEP 3 **Print your Program Code and your Run Time Output**

When completed, print your program source code as well as the program output(s). Attach the hardcopies to your lab cover sheet for credit.

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PROJECT FIVE (Automobile Gas Mileage)

Objective To write a program that uses a function, which computes average fuel consumption.

PROJECT DESCRIPTION

Write a program that uses a function named `CalcAverage()` which calculates the gas mileage for an automobile for each of four weeks. Your function is to display the data shown below, which indicates the week's starting date, number of gallons consumed and the total miles driven, and then your program is to add a new column on the right which displays the average miles per gallon for each week. Also, have your function display the total gallons, total miles and overall average gas mileage for the four week period.

Week of	Gallons	Miles
February 4	9.8	196
February 11	9.5	182
February 18	5.6	101
February 25	7.5	133

Information About This Project

This particular program illustrates the importance of using functions to achieve program modularization. To design a program containing a function, generally three items are necessary: (1) the function prototype, (2) the function call and (3) the function definition. The function prototype for a function named `CalcAverage()`, for example, would be:

```
//function prototype
void CalcAverage();
```

This function prototype declares `CalcAverage()` to be a `void` return type function which does not take any parameters (function arguments). A function prototype is a statement that is normally placed below any preprocessing directives and before the function `main()` program code.

The function call is placed within the `main()` function and is often simply a statement such as:

```
//function call
CalcAverage();
```

The function definition is placed typically after the `main()` function and contains the body or implementation of the function.

```
//function definition
void CalcAverage()
{
  //statements
}
```

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PROJECT FIVE

Steps To Complete This Project

STEP 1 **Open Visual C++ and Write the Program Code**

Open Visual C++ on you computer. Write the program code that will allow the user to enter the necessary input items and then use these items to compute the required output value(s).

STEP 2 **Compile and Run your Program**

Run your program. Test the operation of your program using appropriate numbers for your input variables.

STEP 3 **Print your Program Code and your Run Time Output**

When completed, print your program source code as well as the program output(s). Attach the hardcopies to your lab cover sheet for credit.

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PROJECT SIX (Average Score Program)

Objective To utilize a program that incorporates array elements.

PROJECT DESCRIPTION

Use the source code shown in **Figure 2**, which follows. The code prompts the user for a student name and associated test scores. Run the program for all of the students shown within **Figure 1**, which follows. The program then outputs the final average for each student, from which a final grade can be issued, based upon the standard grading scale.

Information About This Project

This particular program illustrates the power of arrays.

Steps To Complete This Project

STEP 1 **Open Visual C++ and Write the Program Code**

Open Visual C++ on you computer. Write the program code that will allow the user to enter the necessary input items and then use these items to compute the required output value(s).

STEP 2 **Compile and Run your Program**

Run your program. Test the operation of your program using appropriate numbers for your input variables.

STEP 3 **Print your Program Code and your Run Time Output**

When completed, print your program source code as well as the program output(s). Attach the hardcopies to your lab cover sheet for credit.

Figure 1 Data for the Average Score Program

Student Name	Test 1	Test 2	Test 3	Test 4	Final Average	Final Grade
David D. Davies	90	0	79	85		
Fred F. Fredrick	81	37	81	85		
Nancy N. Norwood	93	92	73	93		
Tina T. Taylor	75	93	82	61		
Ronnie R. Reynolds	74	80	93	32		

Figure 2 Source Code for the Average Score Program

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

void main()
{
  char students[5][30];
  int scores[5][4];
  int total[5] = {0};

  for(int i = 0; i <= 4; i++)
  {
    cout << "please enter the student's name\n";

    cin.getline(students[i], 30);

  for(int j = 0; j <= 3; j++)
  {
    cout << "please enter test score " << j + 1 << " for "
         << students[i] << '\n';
    cin >> scores[i][j];
    total[i] += scores[i][j];
    cin.ignore();
  }
  cout << "\n";
  }
  cout << "\n\n**Totals********************** \n";

  for(int k = 0; k <= 4; k++)
  {
    cout << setiosflags(ios::fixed | ios::left);
    cout << setw(20) << students[k] << " " << total[k] / 4
         << endl;
  }
}
```