CISC 105 Spring 2007 Project 1

Due Monday, March 19th at 11:59 pm

electronically on MyCourses, paper to your TA the next day.

This project is about using loops to perform various tasks, and letting the user access the desired task from a text-based menu of numbered choices. But mostly it is about developing ideas in small programs and then putting them together.

Approach

To program this project, approach it the way I have been having you do lab problems, and the way we wrote grades.c together in class:

- separate the problem into pieces

- choose one piece to code in main that does processing without input;

- code it and test it in main using fixed values;

- move the working code into a function and pass it fixed values from main;

- add user or variable input to the program;

- copy the working program and add another piece, or start a new program to make the next piece separately.

I have broken the project into major pieces, but you must break these into smaller pieces. The smaller the pieces, and the more you test, the less likely you will have debugging problems. Remember, only add a couple of lines of code before testing, so that you always know what made the program break (or work!). Save often, and save backup copies!

Each of the first three parts of the project must be completed as a separate program; the fourth part will have you put them all in one program.

0.1 Pizza Cost

Write code that will determine the cost of a square foot of pizza. The inputs to the problem will be the diameter of the pizza and the price of the pizza; output will be a nice message to the user saying how much the pizza costs per square foot.

When this program is done, you will have

1. a calculation function that takes the integer radius (in inches) and the double cost as parameters, and returns the double price per square foot (write this first)

2. an input/output function that is void type. This function will ask the user for the input data, and will display the output. To get the output data, it will call the calculation function. This is the function that your main will call.

For this program, use the formula

$$area_{pizza} = pi * (0.5 * diameter)^2$$

where you can use 3.1416 as an approximation of pi. There are 144 square inches in a square foot.

0.2 Raising a number to a power

Write a program that will raise a number to a positive integer power. For example, $3^5 = 243$ and $-5^3 = -125$.

When this program is done, you will have

1. a calculation function that takes the double base and the integer exponent as parameters, and returns the double value of the base raised to the exponent. To do the calculation, you will use a loop to multiply the base by itself, exponent times. For example, to calculate 3^5, which is $3 * 3 * 3 * 3 * 3$ you would start with 1, then multiply it by 3 five times. To multiply the base five times, you will use a loop to count the number of times, and multiply by the base once each time through the loop.

2. an I/O function that is void type. This function will ask the user for the input data, and will display the output. To get the output data, it will call the calculation function. This is the function that your main will call.

0.3 Converting a temperature

Write a program that will convert Fahrenheit to Celsius or vice versa.
When this program is done, you will have

1. a calculation function that takes the double Fahrenheit temperature and returns the double Celsius temperature.

2. a calculation function that takes the double Celsius temperature and returns the double Fahrenheit temperature.

3. an I/O function that is void type. This function will ask the user which conversion they want to perform. Based on their answer, this function will call the appropriate calculation function, and will display the output. . This is the function that your main will call.

Find the conversion formula in a text book or on the internet.

The Menu

Once you have three programs working perfectly, you will develop a fourth program. This one will have all the function prototypes and definitions of the first three programs. Then use a switch statement to allow a user to select which task to perform ("Enter 1 to find pizza cost, 2 to convert a temperature..."). Finally, enclose the whole switch statement in a sentinel loop so that the user can run the program as many or few times as they wish.

Submission

Design and test your program carefully using data that you make up. Check the calculations! Twenty-four hours before the project is due you will be given test data and a project submission sheet. You must show that your fourth program performs correctly for all test data, and you must complete the **submission sheet** and turn it in with your project's **paper copy** . Of course, code for all **four** programs and your script file must be submitted to **MyCourses**.