

## Introduction to Programming (COP 3223) Section 4 – Program #5

**Due date: Please consult WebCourses for your section**

### Notes

1. Please read the notes on Code::Blocks.

### Objectives

1. To give students practice at typing in, compiling and running simple programs.
2. To learn how to read in input from the user.
3. To learn how to use assignment statements and arithmetic expressions to make calculations
4. To learn how to use the if-then-else construct.

### Problem A: Building a Goldfish Tank

You want to build a goldfish tank and determine how much it will cost. Each tank has three dimensions: length, width and height. The cost of building the tank is simply the cost of the five panes of glass that comprise the tank. (The top of the tank is not enclosed by glass.) Glass costs exactly \$0.02 for one square inch. Define a constant to store this value in your program. Your program should prompt the user for the length, width and height of the tank in inches. Then your program should calculate the cost of building the tank and output that to the screen.

### Input Specification

1. The length, width and height of the tank will be positive integers.

### Output Specification

Output the cost in dollars to build the fish tank to two decimal places. Your output should follow the format below, where XX.XX is the cost in dollars to build the goldfish tank.  
The goldfish tank costs \$XX.XX to build.

### Output Sample

Below is one sample output of running the program. Note that this sample is NOT a comprehensive test. You should test your program with different data than is shown here based on the specifications given above. In the sample run below, for clarity and ease of reading, the user input is given in *italics* while the program output is in bold.

### Sample Run #1

**What is the length of your goldfish tank in inches?**

*24*

**What is the width of your goldfish tank in inches?**

*12*

**What is the height of your goldfish tank in inches?**

*16*

**Your goldfish tank costs \$28.80 to build.**

### **Problem B: Maintaining the Tank**

In order to actually use the goldfish tank you have built, you must maintain it. The cost of maintaining the tank is the volume of the tank multiplied by \$0.005, (half of a penny). Write a program to read in the length, width and height of the tank and output the cost of maintaining the tank.

### **Input Specification**

1. The length, width and height of the tank will be positive integers.

### **Output Specification**

Output the cost in dollars to maintain the fishtank to two decimal places. Your output should follow the format below, where XX.XX is the cost in dollars to maintain the goldfish tank.

The goldfish tank costs \$XX.XX to maintain.

### **Output Samples**

Below are two sample outputs of running the program. Note that these samples are NOT a comprehensive test. You should test your program with different data than is shown here based on the specifications given above. In the sample run below, for clarity and ease of reading, the user input is given in *italics* while the program output is in bold.

#### **Sample Run #1**

**What is the length of your goldfish tank in inches?**

*24*

**What is the width of your goldfish tank in inches?**

*12*

**What is the height of your goldfish tank in inches?**

*16*

**Your goldfish tank costs \$23.04 to maintain.**

#### **Sample Run #2**

**What is the length of your goldfish tank in inches?**

*96*

**What is the width of your goldfish tank in inches?**

*12*

**What is the height of your goldfish tank in inches?**

*20*

**Your goldfish tank costs \$115.20 to maintain.**

### **Problem C: Determining the Profit of the Goldfish Tank**

Using your solutions to problems A and B, you will solve the following problem:

Given the length, width and height of the goldfish tank in inches, determine the amount of profit you can gain by selling the fish in the tank. Assume that each goldfish in the tank requires 250 cubic inches of room in the tank to survive. (Thus, if the dimensions of the tank were 24x12x16 inches, exactly 18 fish could fit in the tank since  $24 \times 12 \times 16 = 4608$  and  $4608/250 = 18.432$ , but you can't have .432 of a fish.) Also, assume that you sell each goldfish for \$5.00. (You can store these values in constants in your program.)

Here's an example worked out:

If the dimensions of the tank are 24x12x16, we have already determined that the cost of building the tank is \$28.80 and the cost of maintaining the tank is \$23.04, so the total cost is \$51.84.

But, we will sell 18 goldfish at \$5.00 dollars a piece for a total gross revenue of \$90.00. Thus, our profit is  $\$90.00 - \$51.84 = \$38.16$ .

There is also a possibility that you may lose money with your fishtank. If this occurs, print out a message (following the sample below) indicating the amount of money lost.

#### **Input Specification**

1. The length, width and height of the tank will be positive integers.

#### **Output Specification**

Output the profit in dollars for selling goldfish to two decimal places. If there was a profit, your output should follow the format below, where XX.XX is the profit from selling the goldfish.

Your profit from selling goldfish is \$XX.XX.

Otherwise, if there was a loss, you should follow the following format:

Your loss from selling goldfish is \$XX.XX.

You may choose to handle the case where there was no profit or loss in any way you see fit.

#### **Output Samples**

On the next page are two sample outputs of running the program. Note that these samples are NOT a comprehensive test. You should test your program with different data than is shown here based on the specifications given above. In the sample run below, for clarity and ease of reading, the user input is given in *italics* while the program output is in **bold**.

**Sample Run #1**

What is the length of your goldfish tank in inches?

24

What is the width of your goldfish tank in inches?

12

What is the height of your goldfish tank in inches?

16

Your profit from selling goldfish is \$38.16.

**Sample Run #2**

What is the length of your goldfish tank in inches?

1

What is the width of your goldfish tank in inches?

1

What is the height of your goldfish tank in inches?

1000

Your loss from selling goldfish is \$65.02.

**Deliverables**

Three source files:

- 1) *tank.c*, for your solution to problem A
- 2) *maintain.c* for your solution to problem B
- 3) *profit.c* for your solution to problem C

All files are to be submitted over WebCourses.

**Restrictions**

Although you may use other compilers, your program must compile and run using gcc in Code::Blocks. Each of your three programs should include a header comment with the following information: your name, course number, section number, assignment title, and date. Also, make sure you include comments throughout your code describing the major steps in solving the problem.

**Grading Details**

Your programs will be graded upon the following criteria:

- 1) Your correctness
- 2) Your programming style and use of white space. Even if you have a plan and your program works perfectly, if your programming style is poor or your use of white space is poor, you could get 10% or 15% deducted from your grade.
- 3) Compatibility to Code::Blocks (using gcc). If your program does not compile in either of these environments, you will get a **sizable** deduction from your grade.