CSE 2050 - Programming in a Second Language (C++)
Homework Assignment 1

August 21, 2014

1 Due Dates

- **August 26, by 11.59pm**: Questions from 1 to 8
- **August 29, by 11.59pm**: Questions from 9 to 16

2 Assignment description

In this assignment, you will implement 16 programs. These programs are simple and somehow repetitive. Here, you will be declaring variables, choosing the appropriate type for each variable. The names of variables should be descriptive (e.g., interestRate, maximumValue). In most of the programs, you will implement simple mathematical calculations, and use the `cout` object to display results on the console. Also, add one-line comments to describe the main steps of the program. Your programs should contain a multi-line header comment similar to:

```
/*
   PROGRAM: CIRCLE.CPP
   Written by Bob the Great
   This program calculates the circumference of a circle.
   Last modification: 8/20/2010
*/
```

The directory `src/` contains a `Makefile` that builds multiple projects. You will edit the makefile so it builds all the 16 programs. Each program will be a separate project.

3 Questions

1. **Sum of Two Numbers**
   Write a program that stores the integers 62 and 99 in variables, and stores the sum of these two in a variable named `total`.

2. **Sales Prediction**
   The East Coast sales division of a company generates 62 percent of total sales. Based on that percentage, write a program that will predict how much the East Coast division will generate if the company has $ 4.6 million in sales this year.

3. **Sales Tax**
   Write a program that will compute the total sales tax on a $52 purchase. Assume the state sales tax is 4 percent and the county sales tax is 2 percent.

4. **Restaurant Bill**
   Write a program that computes the tax and tip on a restaurant bill for a patron with a $44.50 meal charge. The tax should be 6.75 percent of the meal cost. The tip should be 15 percent of the total after adding the tax. Display the meal cost, tax amount, tip amount, and total bill on the screen.

5. **Average of Values**
   To get the average of a series of values, you add the values up and then divide the sum by the number of values. Write a program that stores the following values in five different variables: 28, 32, 37, 24, and 33. The program should first calculate the sum of these five variables and store the result in a separate variable named `sum`. Then, the program should divide the sum variable by 5 to get the average. Display the average on the screen.

6. **Annual Pay**
   Suppose an employee gets paid every two weeks and earns $1700.00 each pay period. In a year the employee gets paid 26 times. Write a program that defines the following variables:

   `payAmount` This variable will hold the amount of pay the employee earns each pay period. Initialize the variable with 1700.0.

   `payPeriods` This variable will hold the number of pay periods in a year. Initialize the variable with 26.

   `annualPay` This variable will hold the employee's total annual pay, which will be calculated.

   The program should calculate the employee's total annual pay by multiplying the employee's pay amount by the number of pay periods in a year, and store the result in the `annualPay` variable. Display the total annual pay on the screen.

7. **Ocean Levels**
   Assuming the ocean's level is currently rising at about 1.5 millimeters per year, write a program that displays:

   The number of millimeters higher than the current level that the ocean's level will be in 5 years.

   The number of millimeters higher than the current level that the ocean's level will be in 7 years.

   The number of millimeters higher than the current level that the ocean's level will be in 10 years.

8. **Total Purchase** A customer in a store is purchasing five items. The prices of the five items are:

   Price of item 1 = $12.95

   Price of item 2 = $24.95

   Price of item 3 = $6.95

   Price of item 4 = $14.95

   Price of item 5 = $3.95

   Write a program that holds the prices of the five items in five variables. Display each item's price, the subtotal of the sale, the amount of sales tax, and the total. Assume the sales tax is 6%.

9. **Cyborg Data Type Sizes** You have been given a job as a programmer on a Cyborg supercomputer. In order to accomplish some calculations, you need to know how many bytes the following data types use: `char`, `int`, `float`, and `double`. You do not have any manuals, so you can't look this information up. Write a C++ program that will determine the amount of memory used by these types and display the information on the screen.

10. **Miles per Gallon**
    A car holds 12 gallons of gasoline and can travel 350 miles before refueling. Write a program that calculates the number of miles per gallon the car gets. Display the result on the screen. Hint: Use the following formula to calculate miles per gallon (MPG): MPG = Miles Driven / Gallons of Gas Used.

11. **Distance per Tank of Gas**
    A car with a 20-gallon gas tank averages 21.5 miles per gallon when driven in town and 26.8 miles per gallon when driven on the highway. Write a program that calculates and displays the distance the car can travel on one tank of gas when driven in town and when driven on the highway. Hint: The following formula can be used to calculate the distance: Distance = Number of Gallons $\times$ Average Miles per Gallon.

12. **Land Calculation**
    One acre of land is equivalent to 43,560 square feet. Write a program that calculates the number of acres in a tract of land with 389,767 square feet.

13. **Circuit Board Price**
    An electronics company sells circuit boards at a 40 percent profit. Write a program that will calculate the selling price of a circuit board that costs $12.67. Display the result on the screen.

14. **Personal Information**
    Write a program that displays the following pieces of information, each on a separate line:

    Your name
    Your address, with city, state, and ZIP code
    Your telephone number
    Your college major

    Use only a single `cout` statement to display all of this information.

15. **Stock Commission**
    Kathryn bought 600 shares of stock at a price of $21.77 per share. She must pay her stock broker a 2 percent commission for the transaction. Write a program that calculates and displays the following:

    - The amount paid for the stock alone (without the commission)
    - The amount of the commission
    - The total amount paid (for the stock plus the commission)

16. **Energy Drink Consumption**
    A soft drink company recently surveyed 12,467 of its customers and found that approximately 14 percent of those surveyed purchase one or more energy drinks per week. Of those customers who purchase energy drinks, approximately 64 percent of them prefer citrus flavored energy drinks. Write a program that displays the following:

    - The approximate number of customers in the survey who purchase one or more energy drinks per week
    - The approximate number of customers in the survey who prefer citrus flavored energy drinks