CS 7A - Fall 2015 - Chapter 3 Problems. Due 9/9/15

In Chapter 3 of PPP (Programming Principles and Practices) we learn about objects, input, variables, type, operations and operators, assignment and initialization, and type safety. Try to use a few comparisons as possible, and to make the code as short as possible, following proper style, of course.

1. Write a program that prompts the user to enter three strings, and then outputs the strings in alphabetical order. So, if the user enters the values Stroustrup, Lovelace, Turing, the output should be Lovelace, Stroustrup, Turing.

   Study Stroustrup's solution to problem #6 and try to improve on it as per his comments at the end:

   > "I think this code is rather tedious. That is, it repeats similar code three times with different variable names. How do we know that it is correct?
   >
   > Is there a *simple* way of doing less work? (yes) Does doing less work make this code easier to understand?
   >
   > What would we have to do to do this exercise for four variables? for five? How many if-statements would you need for four variables? for five variables? Chapter 4 will give us the key tool for better solutions: vectors.

2. Write a program that prompts the user to enter a positive integer dividend and divisor and then repeatedly divide the dividend by the divisor to produce a quotient and remainder. Print out the four quantities: dividend, divisor, quotient and remainder at each stage and then replace the dividend with the quotient before the next iteration. In general, the relationship between these integers is

$$\frac{\text{dividend}}{\text{divisor}} = \text{quotient} + \frac{\text{remainder}}{\text{divisor}}$$

   or perhaps more simply,

$$\text{dividend} = \text{divisor} \cdot \text{quotient} + \text{remainder}$$

```
1  // <write your name and a comment as to what you're doing here>

3  // This is an alternative to "using namespace std"
   #pragma once
5
   //The iostream library includes the std functions "cout", "cin" and "endl".
7  #include <iostream>

9  //Every c++ program must have at least one function whose name is "main()"
   //This is the entry (starting) point of the program.
11 int main() {
       // declare and initialize positive integers dvdnd and dvsr:
13

15     // Use "cout<<" to prompt the user to input two positive integers.

17     // Then input the integers using "cin>>"

19     // Display column headers for "Dividend, Divisor, Quotient, Remainder"

21
```

```
    //while dvdnd > 0
23
    { // The body of the while loop is contained in curly braces
25
        // use the modulo operator % to compute the remainder after
27      // dvdnd is divided by dvsr and print dvdnd, dvsr, quotient
        // and remainder to the console.
29      // For instance, 11 divided by 4 has
        // dividend  divisor  quotient  remainder
31      //   11         4        2         3

33      // Note that these are all integers.

35      // At the end of the loop replace dvdnd by dvdnd/dvsr
    }  // end while loop
37  return 0;
} // end main()
39
/*********************************************************
41 The out put of the program should look something like this:
   ---------------------------------------------------------
43 Enter positive integers a and b and we'll compute the iterated quotient and rem:
   1237 5
45
   Dividend  Divisor quotient  Remainder
47      1237     5       247      2
        247      5       49       2
49      49       5       9        4
        9        5       1        4
51      1        5       0        1

53 Process returned 0 (0x0)   execution time : 11.449 s
   Press any key to continue.
55 *********************************************************/
```

As a follow-up, do you see how to recover the dividend from the divisor and the sequence of remainders?