Homework #2 due 1/22/06…

Using C++ .NET write the following programs. Please email a copy of the working source listing to Steve at sjbrown8@eng.usf.edu.

Exercises

1. Write a C++ program that determines what is the maximum unsigned long integer, the minimum unsigned long integer and the total amount of memory that is required to store a long integer. Make sure that your program output CLEARLY lets the user know which output is which.

2. Do problem #1 again for the signed (+/-) long integers.

3. The price for a barrel of crude oil has been reaching record highs lately. In the United States consumers tend to be aware of the indirect connection between crude oil and gasoline each time they fill up their car at the pumps. Ideally each consumer given the chance would like to have their car get better gas mileage. We usually refer to a cars efficiency based on the ‘miles per gallon’ (mpg) that the car achieves. Write a C++ program that asks the user to input their cars’ mpg, the tank size of the car in gallons, and the price they paid for gas. The program should then output the cost for filling the entire tank, and the cost per mile. Curiously, in Europe, car efficiency is measured in liters per 100 kilometers. Add a line of output to your program that makes this conversion for the benefit of the user.

4. Do the program on page 104 of the book (typecast.cpp) listing 3.14. Include in this program comments that include the definition of typecasting and an explanation of what answers the user should expect.

```cpp
Listing 3.14  typecast.cpp

// typecast.cpp -- forcing type changes
#include <iostream>
int main()
{
  using namespace std;
  int auls, bats, coots;

  // the following statement adds the values as double,
  // then converts the result to int
  auls = 19.99 + 11.99;

  // these statements add values as int
  bats = (int) 19.99 + (int) 11.99;  // old C syntax
  coots = int (19.99) + int (11.99);  // new C++ syntax
  cout << "auls = " << auls << ", bats = " << bats;
  cout << ", coots = " << coots << endl;

Listing 3.14  Continued
  char ch = 'Z';
  cout << "The code for '" << ch << " is ";  // print as char
  cout << int(ch) << endl;  // print as int
  return 0;
}
```
5. Referring to problem #4, write a program that defines each letter of your first name to a variable. Output your name using the variables. Now force your name to be output in integer format (typecasting). Can you see a simple way to ‘encode’ your name?

6. Write a program that asks the user to enter the latitude in degrees, minutes, and seconds and then displays the latitude in decimal format. There are 60 seconds of arc to a minute and 60 minutes of arc to a degree. You should use a separate variable for each input value. Make sure that your program is working correctly!

7. On page 77 of your book (hexoct.cpp) listing 3.3 the author demonstrates how to assign variables with different numbering bases. [decimal is base 10, hexadecimal is base 16, and octal is base 8 – also see appendix A] Modify this listing to include additional output that reconverts the octal & hexadecimal variables so that they are output not only as decimal, but also in their original base. You will have to ‘explore’ your book or the web for the hidden knowledge to answer this problem.

**LISTING 3.3  hexoct1.cpp**

```
// hexoct1.cpp -- shows hex and octal constants
#include <iostream>
int main()
{
    using namespace std;
    int chest = 42;    // decimal integer constant
    int waist = 0x42;  // hexadecimal integer constant
    int inseam = 042;  // octal integer constant

    cout << "Monsieur cuts a striking figure!\n";
    cout << "chest = " << chest << "\n";
    cout << "waist = " << waist << "\n";
    cout << "inseam = " << inseam << "\n";
    return 0;
}
```