

Math 3300 - Homework 1

1. Determine and write an algorithm (a list of steps) to interchange the contents of two cups of liquid. Assume that a third cup is available to hold the contents of either cup temporarily. This is not a programming problem. I'm asking you what steps you would actually need to do.
2. Create appropriate function headers and function declarations (not the function bodies) for the following situations:
 - (a) Given three integers, the function will return the minimum integer.
 - (b) Given a string, the function will return the first character of the string. (To create a string, you use the data type **string**)
 - (c) Given an integer, return the square root of that integer.
3. Create functions (declarations, headers, and bodies) for the following situation:
 - (a) $f(x) = \sqrt{x} + |x^3|$
 - (b) $g(r, n) = \frac{r^n - 1}{r - 1}$ n is an integer, r is a real number.
 - (c) $h(x, y) = x^2 + y^2$
4. Write a single **cout** statement which will output your name on one line, your hometown on the second line, and your major on the third line.
5. Evaluate the following statements the way your compiler would (without using it):
 - (a) $3+4*2/6$
 - (b) $3.0/4+2*6$
 - (c) $3\%4+2-6$
6. Explain what each line of the program below causes to happen:

```
#include<iostream>
using namespace std;
int main()
{
    int num1, num2, product;
    num1=25;
    num2=30;
    product=num1*num2;
    cout << "The product of " << num1 << " and "
         << num2 << " is " << product << endl;
    return 0;
}
```

7. Design and write a C++ **program** to calculate the sum of every third integer from 3 to 999. A formula you can use is:

$$S = \frac{n}{2}(2a + (n - 1)d)$$

where S is the sum you are looking for, n is the number of integers to be added, a is the first number, and d is the difference between consecutive number in the sum. You do not need to calculate this sum (but you are welcome to type up your program and see what it is).

8. Determine and correct the errors in the following programs:

```
(a) #include <iostream>
    using namespace std;
    int main()
    {
        w=15, l=5;
        A=l*w;
        cout<< "The area is " << A;
    }
```

```
(b) #include<iostream>
    using namespace std;
    int main()
    {
        int l, w, A;
        A=l*w;
        l=20;
        w=15;
        cout << "The area is " << "A"
        return 0;
```

```
(c) #include<iostream>
    int main()
    {
        int l=20, w=15, A;
        l*w=A;
        cout << "The area is" A;
        return 0;
    }
```

9. Using output stream manipulators, create a **cout statement** which would output a **table** representing the conversion of 0, 30, 45, 60, and 90 degrees to radians. Recall that to convert an angle in degrees to radians, you would multiply by the factor $\frac{\pi}{180}$. Do not make the calculations yourself, use the **cout** statement to calculate the values and have them displayed correct to 2 decimal places.

10. Write a **program** that asks the user to enter the distance traveled and the total number of gallons of gasoline used to travel that far. Your program will then output the miles per gallon that your car gets. Make your output correct to 1 decimal place.