EECE.3220: Data Structures

Key Questions

C++ I/O Basics (Lectures 2 & 3)

QUESTIONS

1. Describe the key components of the basic C++ program shown below.

```
#include <iostream>

using namespace std;

int main() {
     cout << "Hello World!\n";
     return 0;
}
```

2. Describe the basic input/output streams in C++.
3. Describe the basics of using `cout` and the stream insertion operator for output.
4. Describe the basics of using `cin` and the stream extraction operator for input.
5. Describe the basics of text file I/O in C++.
6. Explain the use of `setprecision`. Why is `fixed` necessary?
7. Explain the stream manipulator `showpoint`.
8. Explain the function used to input one or more characters, including whitespace.
9. Explain the function used to input an entire line. What issues exist when mixing this function with the stream extraction operator? (>>) How can we fix those issues?

EXAMPLES

1. Show the output of the following short programs:

a.

```
#include <iostream>
using std::cout;    // Only includes part of std namespace
                    //  you actually use
int main() {

     // Display message
     cout << "Welcome ";
     cout << "to C++!\n";

     return 0;
}
```

b.

```
#include <iostream>
using std::cout;

int main() {
     cout << "Welcome\nto\n\nC++!\n";
     return 0;
}
```

2. Determine the output of the following short programs:

a. Assume the user inputs: `1 2 4.5`

```
#include <iostream>
using namespace std;

int main() {
    int i, j;
    double x;
    cin >> i >> j;
    cin >> x;
    cout << "output \n";
    cout << i << ',' << j << endl
         << x << "cm" << endl;
    return 0;
}
```

b. Assume the user inputs:
```
1 2
3.4 5
2 3 3.4 7
```

```
#include <iostream>
using namespace std;

int main() {
    int i, j;
    double x, y;
    cin >> i >> j >> x >> y;
    cout << "First output " << endl;
    cout << i << ',' << j << ',' << x
         << ',' << y << endl;
    cin >> x >> y >> i >> j;
    cout << "Second output" << endl;
    cout << i << ',' << j << ',' << x
         << ',' << y << endl;
    return 0;
}
```

3. What is the output of the following program?

```
#include <iostream>
#include <iomanip>
#include <cmath>
using namespace std;

int main()
{
   double root2 = sqrt( 2.0 ); // calc square root of 2
   int places;                 // precision, vary from 0-9

   cout << "Square root of 2 with precisions 0-9." << endl;

   cout << fixed;   // use fixed point format (not sci. not)

   // set precision for each digit, then show square root
   for ( places = 0; places <= 9; places++ )
      cout << setprecision( places ) << root2 << endl;
   return 0;
}
```

4. Show the output of the program below if the input stream is:
   `1  2  3.4  5`

```
// NOTE: The include and using statements are not shown
int main()
{
   double i, j, x, y;
   cin >> i >> j >> x >> y;
   cout << fixed << showpoint;
   cout << "First output " << endl;
   cout << i << ',' << j << ','
       << setprecision(3) << x << ',' << y << endl;
   return 0;
}
```