This worksheet is for your use during and after lecture. It will not be collected or graded, but I think you will find it a useful tool as you learn C++ and study for the exams. Explain all false answers for the "True or False" questions; in general, show enough work and provide enough explanation so that this sheet is a useful pre-exam review. I will be happy to review your answers with you during office-hours, via Email, or instant messaging.

1. Which of the following are true of C++ classes?

   A. A class is a variable that may be assigned values.

   B. `int` and `double` are examples of C++ classes.

   C. `string` is an example of a C++ class.

   D. A C++ class is a special data type.

   E. A C++ class is a special type of variable.

2. Consider the snippet at the right and answer the following questions.

```
4 double GPA(3.8), course_grade;
5 string firstName;
```

   (a) `string` is to `double` as `firstName` is to ???

   (b) `GPA` is to `double` as `firstName` is to ???

   (c) How many `double` variables are declared? What are the name(s)?

   (d) How many class instances are declared? What are the name(s)?

   (e) Explain the difference between symbols `double` and `course_grade`.

   (f) Explain the difference between symbols `string` and `firstName`.

3. Is `cout` the `ostream` class or an instance of an `ostream` type?

4. Is `cin` an `istream` class or an object (variable) of the `istream` class?

5. Why is this C++ statement nonsensical?

```
bool b( int > double);
```

6. Suppose a user types the following sequence of characters at the keyboard (there are several whitespace characters, and the final character is the digit 4):

```
a␣4.23-2.500␣-3,e-100␣4
```

And the keyboard is read by a program running the code sequence to the right.

```
32 char a, b, c;
33 double m, n, p;
34 int x, y, z;
35
36 cin >> a;
37 cin >> m;
38 cin >> x;
39 cin >> b;
40 cin >> n;
41 cin >> y;
42 cin >> c;
43 cin >> p;
44 cin >> z;
```

(a) Complete the table below: provide the value of all variables that are successfully read by `cin` before it encounters a failure state. **Leave any variables that are not valued by `cin` blank**. Note that the variable order in the table is identical to the order of input operations in the code snippet.

Variable	a	m	x	b	n	y
Value						

Variable	c	p	z			
Value						

(b) In a sentence, explain why `cin` entered a failure state.

7. Consider the snippet of code at the right, think about how each equation is simplified and reduced by the compiler. Then, answer the questions below.

```
11 b = ( 1 == 1 ) && false;
12 x = 3 + 4 - 6*2;
13 cout << b << "␣" << x;
```

(a) i. Which operation is performed first in line 11?

ii. What *type* of value does it return? What is the value returned?

iii. What variable type do you expect `b` to be? Why?

(b) i. Which operation is performed first in line 12?

ii. What *type* of value does it return? What is the value returned?

iii. What variable type do you expect `x` to be? Why?

(c) i. How many operations are performed in 13?

ii. What is the left hand side and right hand side argument for the second operation?

iii. What do all the operations return?

iv. Does each operation have a side-effect? What is it?

8. Write a snippet of code that:

   (a) Opens a file named `"the_file.txt"` for writing.

   (b) Using the file stream object as a predicate, prints an error message to the console if part a failed.

9. True or False: After `cout.precision(x);` is used, you are guaranteed `x` decimal points will be used for printing any float or double.

10. True or False:

```
cout.width(10); cout << 3 << 4 << endl;
```

    Prints numbers 3 and 4 with a field width of 10.

11. True or False: After `cout.setf( ios::scientific );` is used, all double values will be printed in scientific notation.

12. True or False: After `cout.setf( ios::right )` is used, output lines are right justified in the console window.

13. Write an application that reads a file consisting of three columns of integers and called `DATA.DAT`. The file does not contain column labels, and your application should meet these requirements:
    1. An error message is displayed if the file cannot be opened.
    2. When the value of the second column is zero, display the value read for the third column, and stop reading data from the file.
    3. The input file stream is closed before the program ends.
    4. If a 0 is not found in second column of data, the program ends without printing anything to the console.
    5. The program should use only one `ifstream` class member function, namely `.close()`.