Assignment #1: Due on Tuesday, June 19

The answers to all these questions can be found in the lecture notes and with some thought.

Classes and Objects:

1. Describe, in your own words, the difference between a class and an object.

2. In the example we discussed on Thursday, June 7, how many variables did the Shooter class definition include? Name them. How many methods, including the constructor, did it have?

Overflow:

3. Let's say I have 2 variables, X and Y, that can each store 4 bits of information. Both the variables have the value 1111 stored in them.
Suppose I want to perform a binary addition of X and Y and store the result in a new variable called Z, which also has **only 4 bits of space**. What will happen when I add X and Y? Will I be able to save the answer in the variable Z? Why or why not? With this example in mind, explain what 'Overflow' is?

**Computer Architecture:**

4. List 3 kinds of machine instructions.
5. What does RAM stand for, and briefly describe what it is? Is the hard-disk part of main memory or secondary memory?

6. Briefly mention a few purposes of an Operating System.

Algorithmic Complexity

7. Given a list A of n items, how much time would a linear search take to determine if an item x is in list A? What about binary search – how much time would it take? What do $O(n)$ time and $O(lg \ n)$ time mean?
8. Describe selection sort in your own words. How much time does selection sort take to sort a list of n items? What is the best case running time for insertion sort? When would it be a good idea to use insertion sort? (Hint: When are you likely to encounter the best case running time for insertion sort?) What is the running time of merge sort?