First name (color-in initial)	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	section (9,10,11, 12,1 or 2)	first name initial	last name initial
Last name (color-in initial)	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z			

H09: Due Tuesday, 02.03 in Lab

Streams (Ch 6), Arrays (7.1, 7,2)
Assigned: Wed 01.21 Total Points: 50

MAY ONLY BE TURNED IN IN THE LECTURE/LAB LISTED ABOVE AS THE DUE DATE,
or offered in person, for in person grading, during instructor or TAs office hours.
See the course syllabus at https://foo.cs.ucsb.edu/16wiki/index.php/W15:Syllabus for more details.

---

(1) (10 pts) Fill in the information below. Also, fill in the A-Z header by

- **coloring in** the first letter of your first and last name (as it appears in Gauchospace),
- writing **either 9,10,11,12,1 or 2** to indicate your **discussion section (lab)** meeting time
- writing your **first and last initial** in large capital letters.

All of this helps us to manage the avalanche of paper that results from the daily homework.

name:	
umail address:	@umail.ucsb.edu

If you collaborated with AT MOST one other person on this homework, write his/her name below. She/he should also have your name on his/her paper.

Reading: Read Chapter 6, plus Sections 7.1 and 7.2 of Chapter 7. (If you don't have a copy of the textbook yet, there is one on reserve at the library.)

Then, answer the following questions. Be sure to check both sides.

2. (2 pts) You've been using `cout` and `cerr` since the beginnning of the course. Both are examples of "streams". In Section 6.1, the author gives a definition of what a "stream" is, including both "input streams" and "output streams". What is the definition the author gives?

3. The streams `cout` and `cerr` go to the screen by default, and `cin` takes input from the keyboard by default. The author indicates that it is also useful to use files on the disk as streams, citing several advantages. Please list at least two of those:
   a. (3 pts) One advantage of using files:

   b. (3 pts) A second different advantage of using files:

4. (3 pts) What include file gives access to the types `ifstream` and `ofstream` for input and output files?

5. According to the author (still in Section 6.1), **a file has two names** when we are working with it. One is the stream name. The other name is only used in one place.
   a. (3 pts) What is this "other name"?

   b. (3 pts) What is the *one place* that this other name is used in your code?

6. Section 7.1 introduces arrays. In the course of the chapter, the author mentions that in 2011, CWE/SANS, an organization of security experts, identified a certain type of error involving arrays as the "third most dangerous programmer error". If you look to the primary source, which is here: http://cwe.mitre.org/top25/#Listing you'll see that the error listed there is actually called *Buffer Copy without Checking Size of Input ('Classic Buffer Overflow')*, and arrays are not specifically mentioned. Nevertheless, our author is correct in identifying this common array error as *one example* of this class of error.
   a. (3 pts) What error involving arrays is our textbook author describing here?

   b. (3 pts) What happens in C++ when you make this error? (Side note: the situation is pretty much the same in C programming as in C++, though Java, Python, and many other languages handle this differently.)

   c. (3 pts) Our author provides a discussion of several strategies to help you prevent this error. For this homework, write at least one of those strategies. (For the exam, be prepared to list MORE THAN ONE. Ask in lecture if you are not sure of what more than one strategy would be.)

7. Pages 391-394 contains a section on passing arrays to functions. It is possibly one of the **most important concepts from the course** and one of the **best written passages in the textbook**. So I encourage you to read it carefully, since I may draw on this passage extensively for exam questions on the next midterm. In particular, display 7.4 shows how to pass an entire array to a function. Pages 393-394 contain some VERY important information about how arrays work in C/C++ and how they work when passed to functions. But you need to start reading from p. 391 to have the proper context, and then read all the way to the end of the section.
   a. (3 pts) The author says that when you declare `int score[5];` the computer reserves enough memory for five variables of type `int`. But, the author says that the computer does NOT keep track of the specific addresses of each of the five int variables. How, instead, does the computer calculate the address of, for example, `score[3]`?

   b. The author says that we can see the declaration of an array as having "three parts". What are these three parts?
      a. (2 pts) first part:

      b. (2 pts) second part:

      c. (2 pts) third part:

   c. (2 pts) Only one of those parts gets passed through when you pass an entire array to a function. Which part is that?

   d. (3 pts) As a result, when you pass an array to a function in C++ (or C), you typically have to pass a second parameter as well. What is that parameter?