COS 220 Spring 2023 Final Exam Practice 1 | 100 min.; 100 pts.; 10 Qs; 10 pgs. 2023-04-27 ∼6:00 p.m.

Name: _____

1. (1 pt.)
   - **Read all material carefully.**
   - *If in doubt whether something is allowed, ask, don't assume.*
   - You may refer to your books, papers, and notes during this test.
   - E-books may be used *subject to the restrictions* noted in class.
   - Computers are not permitted, except when used strictly as e-books or for viewing ones own notes.
   - Network access of any kind (cell, voice, text, data, ...) is not permitted.
   - Write, and draw, carefully. Ambiguous or cryptic answers receive zero credit.
   - Use class and textbook conventions for notation, algorithmic options, etc.
   - Do not attach or remove any pages.

   Write your name in the space provided above.

   Do not write on this page below this point.

WAIT UNTIL INSTRUCTED TO CONTINUE TO REMAINING QUESTIONS.

Do not write on this page.
(It is for use in grading only.)

Q	Full	Score
1	1	
2	2	
3	3	
4	3	
5	3	
6	3	
7	14	
8	25	
9	25	
10	25	
total	100	

2. (2 pts.) Provide a single C++ statement that defines a variable named `pz` that can be used as a pointer to an `int`, and that initializes it to the null pointer.

3. (3 pts.) Provide a single C++ statement that defines a C++ STL *vector*, named `vz`, of double precision floating point numbers and initializes it to contain the elements (in index order): 3.14, 1.5, 9.2, 6.5.

4. (3 pts.) Provide C++ code that prints, to *standard output*, a sequence of k `*` characters, where k is the number of elements (items) in a C++ STL *vector* named `stars`, whose elements are of type `float`.

5. (3 pts.) Provide a single C++ statement that declares a C++ STL *vector*, named `hislah`, containing three elements of type `char`, and initializes it to contain the elements (strings, in index order): `Yes`, `Siree`, and `Bob`.

6. (3 pts.) Provide a single C++ statement that adds the string `!` (consisting of the exclamation mark) as the fourth element of the vector of Question 5.

7. (10 pts.) Provide C++ code that creates an *array* named `as` of appropriate type and size to contain exactly the second, third, and fourth elements of a vector `vs` of strings (in the same order).

8. (25 pts.) Provide **well-formatted source code of a complete C++ program** that

   (a) Defines a function `sum_sq_vec` that takes a single vector (of arbitrary length) of `int`s as argument and that computes the sum of the squares of the elements of the vector (and that uses the most appropriate types for its argument and return value).

   (b) Defines a `main` function that:

      1. Creates a vector of 10 *random* `int`s, with each int being in the range $[0, 99]$ (making proper use of (psuedo)random-number-generation functions).
      2. Prints, to *standard error*, all the elements of the above vector on a single newline-terminated line, with a single space after each element.
      3. Prints, to *standard output*, the result of calling the `sum_sq_vec` function on this vector, followed by a newline.

   Poorly formatted, messy, or otherwise hard to read code will result in very substantial loss of points. *Explain your answer briefly, especially to qualify for partial credit.*

[additional space for earlier material]

9. (25 pts.) Provide **well-formatted source code of a complete C++ program** that

   (a) Reads a sequence of whitespace-separated integers from *standard input* into a suitably defined variable called `nums`. (There may be any number of such integers and the program cannot assume a predefined number or limit.)

   (b) Computes the sum of these numbers in a suitably defined variable called `tot`.

   (c) Prints, to *standard error*, all the numbers read from the input on a single newline-terminated line, with a single space after each number.

   (d) Prints, to *standard output*, `tot` on a single newline-terminated line.

   Poorly formatted, messy, or otherwise hard to read code will result in very substantial loss of points. *Explain your answer briefly, especially to qualify for partial credit.*

[additional space for earlier material]

10. (25 pts.) Provide **well-formatted source code of a complete C++ program** that:

    (a) Defines a vector of `int`s called `avec` that is initialized to the seven elements (in index order): 3, 1, 4, 1, 5, 9, 2.

    (b) Prints, to *standard output*, seven pairs (14 pointers in all) pointer values (one pointer per newline-terminated line) computed as follows: There is one pointer pair for each element of the vector. The first pointer of this pair is a pointer to that vector element. The second pointer of this pair is the first element plus one, using pointer arithmetic.

    Poorly formatted, messy, or otherwise hard to read code will result in very substantial loss of points. *Explain your answer briefly, especially to qualify for partial credit.*

[additional space for earlier material]

[additional space for earlier material]