# CSC 232: Data Structures

**Lab 2: Vectors**

**Due: See BB**

*Submit your program file(s) through BB before midnight on the due date by clicking on “Lab2 Vectors” in the* Assignments & Labs *folder. Email your programs to me* as a last resort *if you experience problems with BB.*

The purpose of this lab is to:

* Learn how to create and use vectors
* Practice using the two main C++ reference websites to get information and syntax on C++ language constructs
* Code a simple program that uses several vector methods

**Requirements**

* Include the comment template at the top of your program.
* Use good coding style. Insert spaces before and after punctuation and variable names, blank lines between blocks of code, 1-line comments where appropriate, etc. *Disorganized, cluttered code is poor code.*
* Use Lab2provided.cpp as a starting point. It generates and prints five random integers.
* Refer to the website [stl::vector basics](http://www.openframeworks.cc/tutorials/c++%20concepts/001_stl_vectors_basic.html) for good descriptions and code snippets on using vectors. For more information on specific vector functions go to one of the two main C++ reference sites [cplusplus.com](http://www.cplusplus.com/reference/vector/vector/vector/) or [cppreference.com](http://en.cppreference.com/w/cpp/container/vector). Or, for example, google for “c++11 vector insert” to find out more about inserting into vectors. You will do this periodically throughout the lab to get the information you need to complete each part below.
* Save Lab2provided.cpp as Lab2.cpp and modify it to perform the following tasks:

1. Create the project.
   1. Open your IDE.
   2. Create an **empty** C++ project.
   3. Give it an appropriate name, like Lab2-vectors, or similar.
   4. Note the path (or Location in VS) where the project is being created – copy Lab2.cpp to this folder.
   5. Add Lab2.cpp to the project. For VS, you can drag and drop a file into the Source Files folder. This may work in other IDEs.
2. Review the code and then run the project. In VS, just hit F5. Other IDEs, click the icon that looks like a solid triangle.
3. Initialize a vector variable of size of 5 with each element = 99.
   1. Go to [cplusplus.com](http://www.cplusplus.com/reference/vector/vector/vector/). Click the C++11 tab. Look at the syntax on the line that starts with *fill(2)*.
   2. http://www.cplusplus.com/reference/vector/vector/vector/
   3. Under the “Construct vector” it says this:

***(2) fill constructor***

Constructs a container with *n* elements. Each element is a copy of *val* (if provided).

* 1. For an example of the exact syntax you need, scroll down to the **Example** section and look at line 9 of the code there.

1. Use a for loop and .at() to print each element of the vector.
   1. Note that VS13 disallows use of the .size() function directly in for loops so assign it to an int first, like this:

int vect\_size = vect.size(); //substitute the name of your vector variable for “vect”

1. Set all vector elements to 0 using .assign and print the vector.
2. Do all these then print. Refer to [stl::vector basics](http://www.openframeworks.cc/tutorials/c++%20concepts/001_stl_vectors_basic.html), [cplusplus.com](http://www.cplusplus.com/reference/vector/vector/vector/), or [cppreference.com](http://en.cppreference.com/w/cpp/container/vector) for more info on specific functions of vectors.
   1. Resize the vector to 7 elements.
   2. Use a for loop and the .at() method to fill the vector with ints from 71 to 77.
   3. Use a new for loop (or include the cout statement in the above for loop) to print each element.
3. Delete the last element using .pop\_back(). Print the size of the vector.
4. Use .insert() and .begin() to insert 100 before the first element using.
5. Resize the vector to 10.
6. Create an iterator for the vector. (Refer to [stl::vector basics](http://www.openframeworks.cc/tutorials/c++%20concepts/001_stl_vectors_basic.html))
7. Use the iterator to print the vector’s elements.
8. Use an iterator to replace each element with a random number between 0 and 9; print the vector.
   1. To get a number between 0 and 9, use the mod operator (%).
9. Go to [stl::vector basics](http://www.openframeworks.cc/tutorials/c++%20concepts/001_stl_vectors_basic.html) as a resource to complete the following:
   1. Sort the vector then print it. You need to add a comparison function (like the example) to your program.
   2. Shuffle the vector then print it.

NOTES:

* In VS, if you get a “cannot write to project.exe”, close VS, run windows task manager and kill any process with that name.
* In Eclipse, you may first have to create a build configuration before running your project for the first time.