Dot Product Assignment (dotcc)
CS 330 - Spring 2017 - Ms. Katz

Due
10pm, Tuesday, February 21

Goals
- to build your C++ skills (functions, parameters, vectors, compiling)
  I realize C++ may be a new language for you; it's okay; you'll be fine
- to show off your best programming style

Overview
This is a straightforward assignment to write a simple program in C++ that computes the dot product of two vectors. Be sure to meet my requirements. You must complete this on your own, but you may ask others about the problem and our system, as well as C++. You need to understand well enough to be able to handle later assignments. You should understand the specifications now because you already wrote a Java version.

Input and Output Specification
All input is from standard input, cin. The first input is one integer representing the length of two vectors. Both vectors are the same length. That integer should be positive and no larger than 100. If it is not, the program should print an error message and quit. Otherwise, the program should read values of type double to fill the two vectors. If there are not enough values, fill with zero. (Hint: To fill with zero when you create the vectors, use 0 as a second parameter to the constructor.) Ignore any extra values.

After input, print a blank line. Then, print each vector on one line with a label at the front. Label each element with its index and have two spaces between elements. Print all real numbers with one digit after the decimal point. See below for a function to do that. You have to write the code to print the index; it is not built-in.

An output line for a vector would look like:

v1: [0] 2.5 [1] -3.0 [2] 1.2

Then print the dot product of the two vectors. The dot product is the sum of the products of the elements with the same index. The vectors must be the same length. The summation formula above is another representation of the dot product. Label your answer.

Other Requirements
Your program should be submitted to my katz330 account by 10pm, Tuesday, February 21st. Submit it as the dotcc assignment. The file should have a .cc ending. The compiler takes other endings, but we’ll use .cc this term.

Use the g++ compiler in our Linux lab with the -Wall option to report all warnings as in:

g++ -Wall -std=c++14 Program.cc

The program should compile cleanly with no errors or warnings. When it does and you use the above command, you will have an executable named a.out. Run it using

./a.out

You must use functions throughout this program. Use parameters and pass them appropriately. If a parameter shouldn’t change, make sure it doesn’t. Each function should do one thing well (have high cohesion).

You must use the vector class from the Standard Template Library. Its size( ) member function returns an unsigned (not int) value. Do not declare bigger vectors than you need. Note that vectors do
not check whether you go outside their declared bounds.

Declare storage as locally as possible to complete the task. Do not declare global variables.

Use good programming style including a summary comment with your name at the top. Each function should have a short summary comment describing what it does in terms of its parameters. That comment should be on the function prototype above the main function. The function implementation below main does not need a comment. Put your name and the month of creation, a description of the problem, and a description of the inputs and outputs in a comment at the top. Use consistent indenting that reflects the structure of the code. Take the time to do this assignment neatly and correctly.

**End of file**

Use a while loop similar to the one below to read the values. When the reading fails for any reason (end-of-file, input that doesn't match type), the reading returns false and stops the loop.

```cpp
while (cin >> num) {
}
```

**Output Digits**

The easiest way I've found for setting how many digits to use after the decimal point when printing real numbers is to use my `setOutputDigits` function. You'll need to put this function in your code and then call it once before printing to set how many digits to use throughout the rest of the execution. Note that you can copy and paste this code from the web page.

```cpp
// set pretty output format and number of digits after decimal
void setOutputDigits(int digits) {
    cout.precision(digits);
    cout.setf(std::ios::fixed | std::ios::dec | std::ios::showpoint);
}
```

You may also use `printf`.