CS142/IT501 **Assignment 9** Fall 2016

Given: Fri Nov 18

Due: Thu Dec 1, 1 p.m.

1. (28%) Suppose that the file `books.txt` contains the titles, authors and years of publication of a collection of books. The data for each book is given on three consecutive lines, in the following format:

   ```
   Title
   Author(s)
   Year of publication
   ```

   Write two *separate* pieces of code that perform the following tasks:

   (a) Read the file and store all the data in a map. The titles of the books should be used as keys. Include a declaration of the map and any other data types you may need.

   (b) Assuming that Part (a) has been done, print to standard output the titles of all the books that were published since 2005.

2. (72%) Create a class `String` similar to the C++ class `string`. Include the following operations. These operations are described in Section 3.2 of the notes.

   (a) A default constructor.

   (b) A constructor that takes a C string as argument.

   (c) The method `length()`.

(d) An indexing operator.

(e) The method `clear()`.

(f) The operator `+`.

(g) The version of method `replace(i, m, s2)` in which the third argument is a `String` object.

(h) The method `c_str()`. (This method should return a pointer to a C string that is stored in the `String` object itself.)

If needed, also include a destructor. Note that there should be no limit on how large strings can be (other than maximum size of arrays in C++). Submit your test driver. *Tip*: Consider how you will implement the method `c_str` before deciding how you will store the characters of your `String` objects.

The easiest way to implement this class is to use an STL `vector` to store the characters of the string. But, for the purposes of this assignment, you are not allowed to do that. Instead, you have to directly use a dynamically allocated array.