CS 100: Section Assignment 7

(For the week of March 15)

Section assignments are discussed in section and are not submitted for grading. They relate to recent lecture topics and usually to the current Programming Assignment. Prelim questions are based on Section Assignments, Programming Assignments, and Lecture examples.

1. If there is a new moon twice during the same month, then the second new moon is called a "blue moon." If you do the arithmetic, then you'll see that there can be at most one blue moon during a given year. Implement the following method in the class Date:

```
// Yields true if year y has a blue moon
public static boolean isBlueMoonYear(y)
```

Hint: How many news moons have there been since the base new moon as of Jan 1 of year *y*? How many new moons have there been since the base new moon as of Jan 1 of year *y*+1? What can you say about the difference between these two integers. (Assume that the class Date has been fully implemented as described in P4 and make effective use of the methods and constants therein.)

2. Implement the following method in the class RN

```
// Yields the Roman Numeral representation of the product of the numbers
// represented by the Roman numeral strings r1 and r2.
Public static String prod(String r1, String r2)
```

Thus, RN.prod("VII","IX") would yield the string "LXIII".

3. Complete the following fragment so that the string "zyxwvutsrqponmlkjihgfedcba" is displayed.

```
String S1,S2;
S1 = "abcdefghijklmnopqrstuvwwxyz";
 ????
System.out.println(S2);
```

Design your solution so that the reverse string is printed regardless of the string object referenced by S1. For your convenience, here some methods that pertain to strings

length	The number of characters that "make up" the string.	s.length() yields the number of characters in the string object referenced by s. Thus, "a" has length 1, "abc" has length 3, and ""(the empty string) has length 0.
indexOf	Used to locate the first occurrence of one string in another. Characters in a string are indexed from zero starting with the leftmost character.	If s = "abcdbc" then s.indexOf("a") yields 0, s.indexOf("bc") yields 1, and s.indexOf("cb") yields –1 because no occurrences are found.
substring	Used to extract a contiguous portion of a string.	If i and j are integers then s.substring(i,j) yields a string that is made up of the characters in positions I thru j-1. Thus if s = "abcdef" then s.substring(3,4) yields "d", s.substring(3,6) yields "def", substring(3,3) yields the empty string, and s.substring(3,10) is an error.
equals	Used to find out if one string equals another.	If s1 and s2 refer to string objects then s1.equals(s2) is true if the two strings are equal in each position.
concatenation	Used to "glue" one string to another.	If s1 ="ab", s2 = "xyz", and s3 = s2+s1+s2, then s3 references "xyzabxyz".

4. We say that the color (r_1,g_1,b_1) is the complement of the color (r_2,g_2,b_2) if $r_1+r_2=255$, $g_1+g_2=255$, and $b_1+b_2=255$. (a) Modify the paint method in the class DisplayColor so that if k is odd, then the complement of the interpolated color is used when the kth vertical line segment is drawn. If k is even, the interpolated color should be used. (b) Modify the paint method in the class ShowColorGrid so that the tile in row *i* and column *j* is displayed the same way if *i* is less than or equal to *j*, but that the complement color is used whenever *i* is greater than *j*.