Searching an Array

- Many ways to search an array for a specific value
- Simplest is called a *linear search*

Linear Search:

- Looks at each array element in turn until the specified value is found or the end is reached

Example: Search Class (contains a linear() method that returns the index of a specified `int` element, and -1 if not found)

```
/*
 * Search.java
 */

public class Search {

	/**
	 * Returns the index of the element numToFind in array array.
	 * -1 returned if element not found.
	 * pre: none
	 * post: index of numToFind has been returned. -1 has been
	 * returned if element not found.
	 */
	public static int linear(int[] array, int numToFind) {
		int index = 0;

		while ((array[index] != numToFind) && (index < array.length - 1))  {
			index += 1;
		}

		if (array[index] == numToFind) {
			return(index);
		} else {
			return(-1);
		}
	}
```

this while loop checks all but the last element of the array

And here is the client code: NameFind:

```
import java.util.Scanner;
 import java.util.Random;

 /**
  * Searches an array for a name.
  */
public class FindNum {

      public static void main(String[] args) {
            final int MAX = 20;
            int[] numArray = new int[MAX];
            Scanner input = new Scanner(System.in);
            int num, location;

            /* fill array with numbers */
            for (int i = 0; i < numArray.length; i++) {
                  numArray[i] = (int) (MAX + 1) * Math.random();
            }

            /* prompt user for a number to search for */
            System.out.print("Enter a number to search for: ");
            num = input.nextInt();

            /* Search for number and notify user of location */
            location = Search.linear(numArray, num);
            if (location == -1) {
                  System.out.println("Sorry, number not found in array.");
            } else {
                  System.out.println("First occurrence is element " +
location);
            }
      }
}
```

Output:

```
Enter a number between 0 and 20: 7
First occurrence is element 11
```

Programming Exercise:

Add a `static` method to the Search class that performs a linear search on a String array. The linear() method should overload the existing method, have parameters for accepting a String array and a String variable, and return an `int` indicating the position of the String. Create a NameFind application that uses the Search class. NameFind should prompt the user for names to fill an array and then prompt the user for the name to find.

Submit your source code this exercise to the Google Doc "ICS4U – Activity Submission Form"