Let’s try ...

Assignment 5 due this week Friday at 5pm

We’ll see how it works, versus Thursday

Observation about midterm ...

I think I see a correlation between
Code that looks like “first draft”
  => Answers that get lost
Code that looks like “second draft”
  Planned out, pseudocode before code
  => Simple, clean, correct

Aside ... reading API documentation

API = “application programming interface”
  “application programming” – that’s us
  “interface” – how we can use the libraries

Example: We want to change a string to a character array. How?
The first hit: An example

```java
//
// Main.java
//
// Author: www.javadb.com
//
//
// public class Main {
//  *
//  * Converts a String to a character array
//  *
//  * public void convertStringToCharArray() {
//  *  String str = "A value";
//  *  char[] charArray = str.toCharArray();
//  *}
```
After some general overview ...

We find lots of methods ...

With full details ...

How do we call it?

public char[] toCharArray()

No arguments?? What’s with this?

return type: It will produce a value of type “char []” (array of char)
Methods: Static and not static

Compare
public static char[] toCharArray(String s)
called like this:
    char [ ] myArray = Array.toCharArray(s)
to
public char[] toCharArray( )
called like this:
    char [ ] myArray = s.toCharArray( )

Static vs dynamic methods

Static method belongs to the class
We don’t need to create an object to use it

Dynamic methods belong to each object
The object (e.g., the String s) is passed implicitly as the first argument.
More on this next week ...

Indexed Color Images

Arrays (continued)

Some applications
More on processing arrays
Image processing is matrix processing

Image is matrix (grid) of pixels
Example operations:
- Composite (blend) images
- Blur image, or sharpen edges
- Scale image

How would you do these?
(just strategy or very rough pseudocode)

Blur

For each pixel in blurred image
Value is weighted average of surrounding pixels in old image

Unsharp Mask (edge sharpening)

1. Create a blurred image
2. Subtract blurred image from original (called “high pass filter”)  
3. Add high-pass filtered image to original

Each step creates a new matrix of pixels from one or two other matrices, looping through all the pixels
Class exercise: String scrambler

Input: A word on the command line
Output: Scrambled word:
Same characters, random order

Pseudocode first; then code if time allows

Scrambler Approaches

1\textsuperscript{st} approach suggested by students in class:
Start with all letters in original word, no letters in new copy.
While some left in original: Randomly choose one to move to copy. (Move last letter of original into the gap and shorten original.)

2\textsuperscript{nd} approach suggested:
For each letter in original, choose a random position to swap it with.
Either one is good. My sample in next slides is like 2\textsuperscript{nd}.

Scrambler method ...

```java
static String scramble( String s) {
    Random rand = new Random();
    char [ ] schars = s.toCharArray();
    for (int i=0; i < schars.length; ++i) {
        int swapPos = rand.nextInt(schars.length);
        swap(schars,i,swapPos);
    }
    return new String( schars );
}
```

Swap array elements

```java
static void swap(char [ ] letters, int i, int j) {
    char temp = letters[i];
    letters[i] = letters[j];
    letters[j] = temp;
}
```