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CS 106A

Section #4
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Solution to Section #4

Portions of this handout by Eric Roberts , Patrick Young, Jeremy Keeshin, and Julia Daniel

Warmup:

1. True
2. False; strings are immutable. So **`charAt()`** can't be used to reassign characters in a string – it can only be used to retrieve the character in a string at a specific index.
3. False; this approach (building a new string out of substrings and then reassigning it to the old string's variable) is *almost* correct, but there's an off-by-one error in the bounds on the first substring, so it actually prints **`"CS10A rocks my socks!"`**.

1. Adding commas to numeric strings

```
private String addCommasToNumericString(String digits) {
   String result = "";
   int len = digits.length();
   int nDigits = 0;
   for (int i = len - 1; i >= 0; i--) {
      result = digits.charAt(i) + result;
      nDigits++;
      if (((nDigits % 3) == 0) && (i > 0)) {
         result = "," + result;
      }
   }
   return result;
}
```

2. Deleting characters from a string

```
private String removeAllOccurrences(String str, char ch) {
   String result = "";
   for (int i = 0; i < str.length(); i++) {
      if (str.charAt(i) != ch) {
         result += str.charAt(i);
      }
   }
   return result;
}
```

A slightly different approach that involves a **`while`** loop instead of a **`for`** loop:

```
private String removeAllOccurrences(String str, char ch) {
   while (true) {
      int pos = str.indexOf(ch);
      if (pos >= 0) {
         str = str.substring(0, pos) + str.substring(pos + 1);
      } else {
         break;
      }
   }
   return str;
}
```

3. Separating Digits and Letters

```
private String separateDigitsAndLetters(String str) {
    String numbers = "";
    String letters = "";
    for(int i = 0; i < str.length(); i++) {
       char ch = str.charAt(i);
       if (Character.isLetter(ch)) {
          letters += ch;
       } else if (Character.isDigit(ch)) {
          numbers += ch;
       }
    }

    return numbers + letters;
 }
```

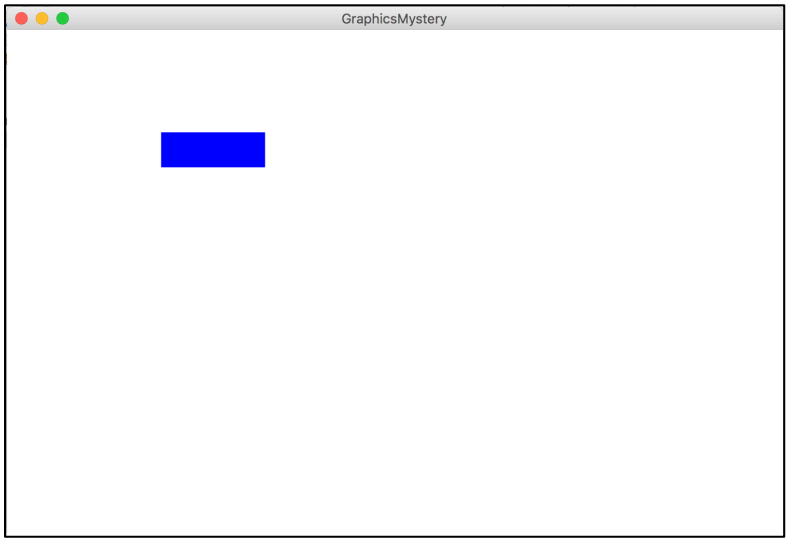
4. Pig Latin

```
 private String pigLatin(String word) {
    if (word.length() == 0) {
       return "";
    }

    // Words starting with vowels
    if (isVowel(word.charAt(0))) {
       return word + "yay";
    }

    // Words starting with consonants
    int firstVowelIndex = 1;
    for (int i = 1; i < word.length(); i++) {
       if (!isVowel(word.charAt(i))) {
          firstVowelIndex++;
       } else {
          break;
       }
    }

    return word.substring(firstVowelIndex) +
          word.substring(0, firstVowelIndex) + "ay";
}

 /* This is a helper method that returns true if ch is a vowel,
  * and false otherwise.
  */
 private boolean isVowel(char ch) {
    return ch == 'a' || ch == 'e' || ch == 'i' || ch == 'o'
          || ch == 'u';
}
```

A slightly different approach that involves a **`while`** loop instead of a **`for`** loop:

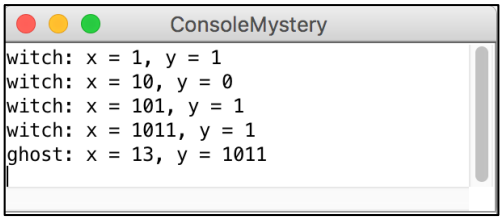
```
private String pigLatin(String word) {
   if (word.length() == 0) {
      return "";
   }

   // Words starting with vowels
   if (isVowel(word.charAt(0))) {
      return word + "yay";
   }

   /* Word starting with consonants:
    * increment firstVowelIndex while we have not gotten
    * to the end of the string, and have not seen a vowel.
    */
   int firstVowelIndex = 1;
   while (firstVowelIndex < word.length() &&
          !isVowel(word.charAt(firstVowelIndex))) {
      firstVowelIndex++;
   }

   return word.substring(firstVowelIndex) +
         word.substring(0, firstVowelIndex) + "ay";
}

 /* This is a helper method that returns true if ch is a vowel,
  * and false otherwise.
  */
 private boolean isVowel(char ch) {
   return ch == 'a' || ch == 'e' || ch == 'i' || ch == 'o'
         || ch == 'u';
}
```

5. Tracing method execution - Graphics



There is one GRect filled blue, with x and y coordinates of (150, 100), a width of 100 and a height of 33.33333… .

6. Tracing method execution - Console



Style Focus for Section 4

Common Programming Idioms: A programming *idiom* is a commonly used expression or pattern, like using ++ to increment a variable, or the loop-and-a-half. In this section we went over a common pattern of iterating through a string and building up a new result string. It is good to familiarize yourself with common programming idioms because you will see them appear in others' code, and it will make your own code better.