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CS 106A

Section #2
January 22, 2018

Section Handout #2—Simple Java

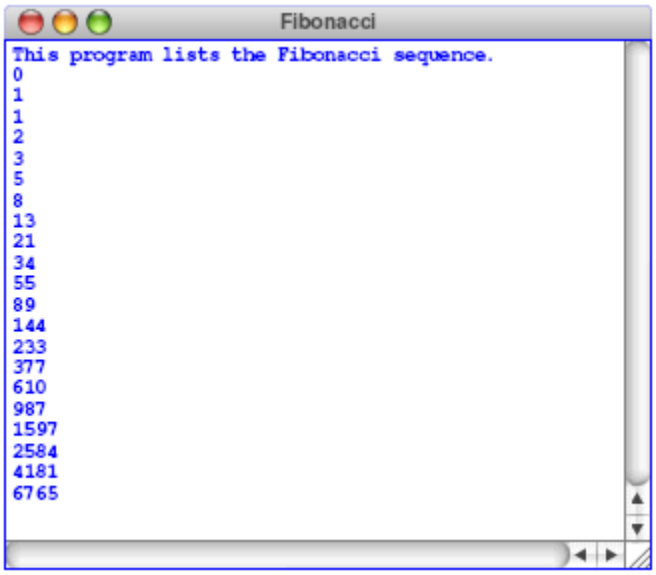
Portions of this handout by Eric Roberts

1. The Fibonacci sequence

In the 13th century, the Italian mathematician Leonardo Fibonacci—as a way to explain the geometric growth of a population of rabbits—devised a mathematical sequence that now bears his name. The first two terms in this sequence, **Fib**(0) and **Fib**(1), are 0 and 1, and every subsequent term is the sum of the preceding two. Thus, the first several terms in the Fibonacci sequence look like this:

Fib(0)	=	0	
Fib(1)	=	1	
Fib(2)	=	1	(0 + 1)
Fib(3)	=	2	(1 + 1)
Fib(4)	=	3	(1 + 2)
Fib(5)	=	5	(2 + 3)

Write a program that displays the terms in the Fibonacci sequence, starting with **Fib**(0) and continuing as long as the terms are less than or equal to 10,000. Thus, your program should produce the following sample run:



This program should continue as long as the value of the term is less than or equal to the maximum value. To do this, you should use a **while** loop, presumably with a header line that looks like this:

```
while (term <= MAX_TERM_VALUE)
```

Note that the maximum term value is specified using a named constant. Your program should work properly regardless of the value of **MAX_TERM_VALUE**.

2. Calculating lines

Write an interactive console program that calculates *y* coordinates on a line. First, it prompts the user for a slope, *m*, and an intercept term, *b* (remember that a line has an equation of the form $y = mx+b$). Then, the program prompts the user for *x* values until the user enters the **`SENTINEL`** (the value of which is specified using a named constant). For each entered number, print the *y* value on that line for that entered *x* value. Here is a sample run of the program, with **`SENTINEL = -1`** (user input is underlined):

```
This program calculates y coordinates for a line.
Enter slope (m): 2
Enter intercept (b): 4
Enter x: 5
f(5) = 14
Enter x: 1
f(1) = 6
Enter x: -1
```

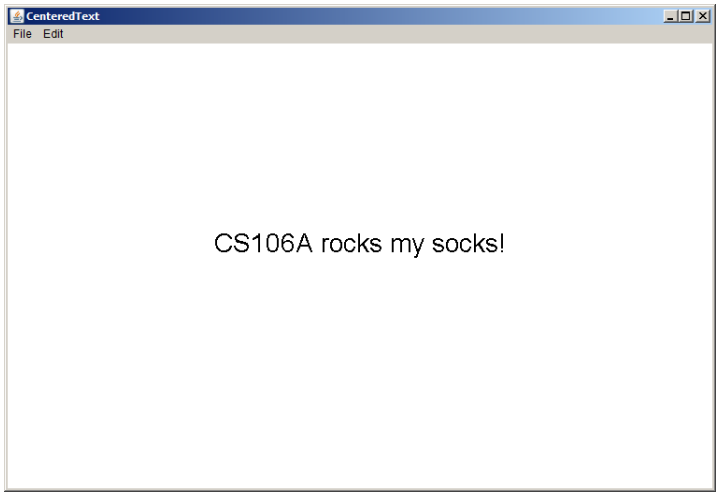
Your program should work properly regardless of the value of **`SENTINEL`**.

3. Drawing Centered Text

Your job is to write a **`GraphicsProgram`** that displays the text message (i.e., **`GLabel`**):

CS106A rocks my socks!

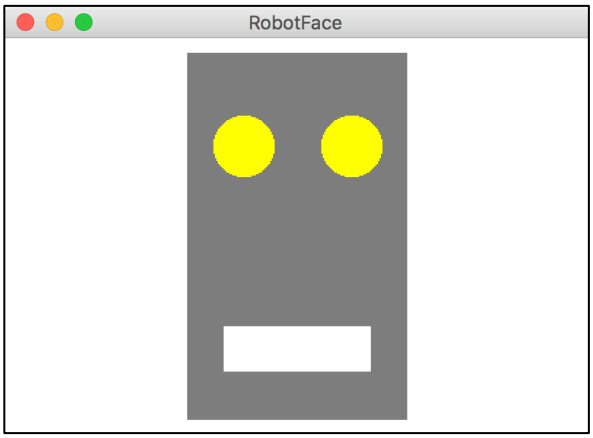
The text should be displayed in SansSerif 28-point font, and centered horizontally and vertically in the middle of the graphics window, looking something like this:



You can find the width of a label by calling **`label.getWidth()`** and the height it extends above the baseline by calling **`label.getAscent()`**. If you want to center a label, you need to shift its origin by half of these distances in each direction.

4. Drawing a face

Your job is to draw a robot-looking face like the one shown in the following sample run:



This simple face consists of four parts—a head, two eyes, and a mouth—which are arranged as follows:

- *The head*. The head is a big rectangle whose dimensions are given by the named constants **`HEAD_WIDTH`** and **`HEAD_HEIGHT`**. The head is gray.
- *The eyes*. The eyes should be circles whose radius in pixels is given by the named constant **`EYE_RADIUS`**. The centers of the eyes should be set horizontally a quarter of the width of the head in from either edge, and one quarter of the distance down from the top of the head. The eyes are yellow.
- *The mouth*. The mouth should be centered with respect to the head in the *x*-dimension and one quarter of the distance up from the bottom of the head in the *y*-dimension. The dimensions of the mouth are given by the named constants **`MOUTH_WIDTH`** and **`MOUTH_HEIGHT`**. The mouth is white.

Finally, the robot face should be centered in the graphics window.