Section Handout #2—Simple Java
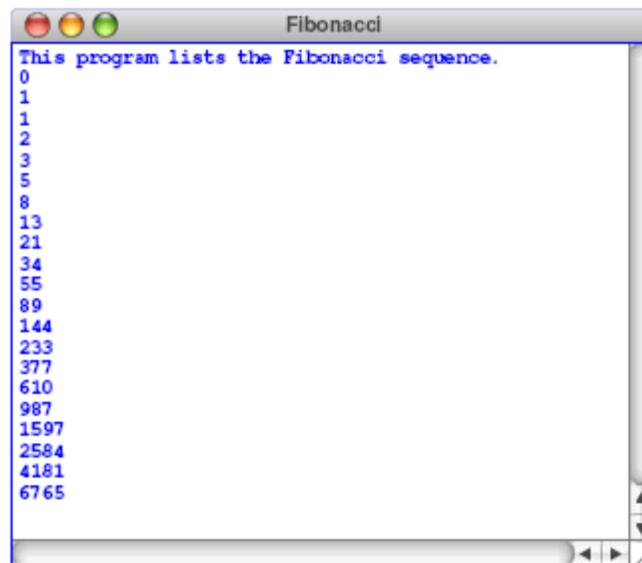
1. The Fibonacci sequence

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:

$$\begin{aligned}
\texttt{Fib}(0) &= 0 \\
\texttt{Fib}(1) &= 1 \\
\texttt{Fib}(2) &= 1 \quad (0+1) \\
\texttt{Fib}(3) &= 2 \quad (1+1) \\
\texttt{Fib}(4) &= 3 \quad (1+2) \\
\texttt{Fib}(5) &= 5 \quad (2+3)
\end{aligned}$$

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 10,000. Thus, your program should produce the following sample run:

```
This program lists the Fibonacci sequence.
0
1
1
2
3
5
8
13
21
34
55
89
144
233
377
610
987
1597
2584
4181
6765
```

This program continues as long as the value of the term is less than the maximum value, so that the loop construct you need is a `while`, 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.

2. Drawing a face

Your job is to draw a robot-looking face like the one shown in the following sample run:
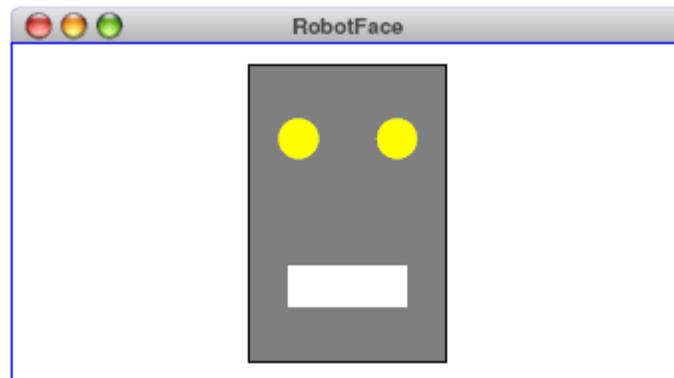
This simple face consists of four parts—a head, two eyes, and a mouth—which are arranged as follows:

- *The head.* The head is a big rectangle whose dimensions are given by the named constants `HEAD_WIDTH` and `HEAD_HEIGHT`. The interior of the head is gray, although it should be framed in black.

- *The eyes.* The eyes should be cricles 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.