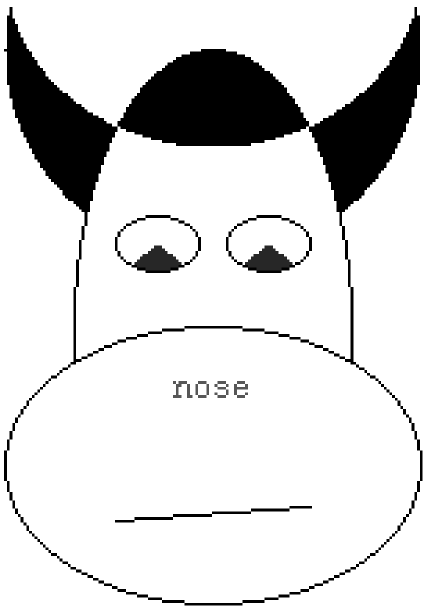
Laboratory 3: Draw Your Favorite Mascot

Objective. Gain experience with building a Java program from scratch.

Discussion. In this lab we will focus on constructing an entire program from scratch. Every aspect of its *design* will be decided by you. The general goal is to draw an image of your favorite mascot. One of the authors sheepishly submitted this picture of a horned member of the bovine family:



(It looks better in purple.) It is interesting to note that even though the `element` package is limited to drawing primitive shapes, the end result is a picture with fairly complex components. Thus, we're not interested in realism, but a demonstration of your skills with manipulating the various shapes with different colors and pen modes.

From this lab forward, you will find it useful to develop a *design* before you start writing Java. In this case, it's most useful to sketch your picture on graph paper, keeping in mind that all of the features of the picture must be drawn with fairly simplistic primitives. The graph paper also helps to easily locate important points within your artwork as you generate the supporting Java code. Word to the wise: program design can be done without computers; programming cannot.

Procedure. Carefully follow the steps below while developing your picture:

1. Sketch a picture of your mascot on graph paper. Use the graph paper to orient your picture within the drawing window. Remember that each feature drawn on the paper is translated into one or more Java statements! Keep things simple at first, add detail later.

2. Identify the order that features must be drawn. Remember that paint applied early on is obscured by paint applied later. Practicing artists will find this a natural step. The rest of us must develop this skill with care.

3. For each feature of your mascot, declare a graphical object that describes that feature. Whenever possible, use constants (values declared `final`) to locate these objects in the drawing window. For example, you may define a constant `noseY` that locates the height of the center of the nose. If the nose needs to be moved later, you can modify the value of `noseY` in one place.

4. Draw, fill and clear objects as necessary to complete your image. If you use color, don't forget to import `java.awt.Color` to make use of predefined colors. Also, remember that if you use an inverting pen, you must only invert black and white pixels. The result of inverting colored pixels is not easily predicted.

5. If you're comfortable with looping constructs you can optionally add a repeated feature—blades of grass, stars, etc.

6. Take pride in your work. Sign your name at the bottom with a `Text` object, and save your program.

Thought questions. Consider the following questions as you complete the lab:

1. It appears the bovine's jowls were drawn with a `draw` command. The outline of the head, however, was drawn with an oval and not an arc. How *were* the jowls drawn?

2. How are our bovine horns drawn?

3. How is our bovine's cap drawn?