The penguin drawing process occurs in the method drawEntireBody in draw.cpp. This method begins by drawing the body, which is the lowest object in the stack of penguin parts. After drawing the body, it draws each part lower in the tree (which corresponds to higher in the matrix stacks). These parts are drawn in their respective functions - drawArm, drawLeg (used twice for each leg), and drawHead. drawLeg also draws a foot for each leg drawn, and drawHead takes care of drawing the beak (which is split up into drawing the top part of the beak and the bottom part of the beak).

Scales are used to uniformly shrink each part lower in the tree. In some cases, no further scale is applied (as in the case of the feet).

Each object is drawn with a set of points specifying its shape; this is signified by a call to drawPolygon. Scales are only used to give the overall scale of the body part relative to its parent part. I originally used non uniform scales for some body parts in order to specify the shape as well as the size, but it lead to skews on rotation of that part so I switched to using points to define length and width of each part.

There are a set of 6 values which specify the rotation angle for each part. However since the radian value is calculated the same way for each part (in the animate function), on animation, each part has the same angle (as a portion of its own minimum/maximum values). Limbs (legs, arm) have a different set of minimum and maximum values for rotation, as I felt that they had the greatest degree of freedom when it came to this. Feet have the second greatest, and the head has a very limited rotational degree of freedom because penguins do not really have necks.

The animation itself can be played by checking off the “play animation” checkbox. The penguin walks left. There is a slight glitch where near the end it is still translating to the left but only one foot is rotating. Once the penguin stops moving, it looks down and then up and opens its beak as if in surprise.