Lab 2: Drawing

Consult the CS 105 LEARN Site for lab due dates and standard lab instructions.

1. **Exercises in simple sketches.**

   Unless stated otherwise, each sketch uses a 100 x 100 canvas and background shade of 220. **You should write all solutions as one setup function.** Don't forget to use good style (e.g. indent, whitespace, semicolons).

   HINT: Use the 100 x 100 graph paper from lecture (and available on LEARN). This makes planning the drawing and figuring out the coordinates for the drawing functions much, much easier.

   **NAME each sketch as “lab_02_1a”, “lab_02_1b”, etc.**

   a. Draw two lines to make the cross drawing below. Each line is 50 pixels long.

   ![Cross Drawing](cross.png)

   b. Draw a filled triangle so the top point is halfway across the top of the canvas and the two bottom points are at bottom left and bottom right corners. You should see all of the triangle's black stroke.

   ![Filled Triangle](filled_triangle.png)
c. Draw an isometric cube like the example below. Leave approximately a 5 pixel margin at top and bottom and 10 pixel margin at left and right.

![Isometric Cube](image)

d. Draw two circles 35 pixels in diameter, and two 35 by 35 pixel squares. Space them to create a 10 pixel margin around the shapes and between shapes.

![Shapes](image)

e. Draw a face like the one below. The head is centred in the canvas and it is 80 pixels in diameter. Each eye is 20 pixels in diameter with a pupil 3 pixels in diameter. The left end of the mouth aligns with the centre of the left eye, and the right end of the mouth aligns with the centre of the right eye.

![Face](image)

f. Draw the simple landscape shown below. Your shapes don't have to be in exactly the same positions or sizes.

![Landscape](image)
g. Draw the tile pattern below.

HINT: you can do it using only 1 rect, 2 ellipses, 4 triangles, and 1 quad.

2. **Build a Castle!**

Follow the steps below, your shapes don't have to be in exactly the same positions or sizes. You will find graph paper very useful. Use the default 100 x 100 canvas and background shade 220.

a. Step 1: Create the wall and three towers using four rectangles:

Step 2: Add three identical triangles for tower roofs:

Step 3: Add a small flag on top of each roof:
Step 4: Add an oval window on each tower and a main door to the wall. You can do this just using only ellipses and a rectangle.

NAME your final sketch “lab_02_castle”

Submitting

Submit a single ZIP file called “lab_02.zip” containing all your sketches, see “How to Save and Submit” (on CS 105 LEARN Site).

It is your responsibility to submit to the correct files to the correct dropbox before the deadline. Otherwise, you will receive a mark of 0.
Optional Extra Question

Attempt these only if you have time and want to practice and learn more. It will not count towards your lab mark, and you will not hand it in.

3. Create a curvy vase using bezier curves in a 300 by 300 canvas.

   HINT: Scroll down to read “Designing Bezier Curves”.

   a. Design and code the left side of a vase in a 300 x 300 canvas. You can do this with a single curve. Because of the way Processing fills bezier curves, you'll need the noFill() function in the starter code. You don't need to make the vase look the same as the example below.

   ![Bezier Curve Example](image1.png)

   b. Add a symmetrical bezier curve for the right side of your vase and a line or ellipse for the top. Increasing the strokeWeight will make matching the ends easier.

   HINT: To create a symmetrical curve, mirror all x-coordinates of the curve’s points using a vertical axis of symmetry. For example, if the axis of symmetry is x = 150 and the point has an x-coordinate of 55, the mirrored x-coordinate of that point is \((2 \times 150) - 55 = 245\). Your axis of symmetry is defined by the x-coordinate of either the first point or the last point (depending which direction you draw the curve).

   ![Symmetrical Curve Example](image2.png)
Designing Bezier Curves

Use The SVG/VML Bézier Curve Construction Set website. It lets you drag the ends and control points to make the desired curve, then displays the coordinates of the start, end, and control points of the corresponding bezier curve as a sequence of 8 numbers (with letters M and C), like “M 156, 165 C 139, 86, 45, 183, 73, 94”. Just remove the letters M and C, and paste the numbers into the parameter list for the bezier function in the same order, like this:

```javascript
bezier(156, 165, 139, 86, 45, 183, 73, 94);
```

<table>
<thead>
<tr>
<th>Bezier Curve Editor</th>
<th>Processing Code</th>
<th>Result</th>
</tr>
</thead>
</table>
| ![Bezier Curve Editor](image1.png) | ```javascript
function setup() {
  createCanvas(400, 400);
  background(220);
  noFill();
  strokeWeight(5);
  bezier(156, 165, 139, 86, 45, 183, 73, 94);
}
``` | ![Result](image2.png) |