CS/INFO 3300; INFO 5100
Homework 3
Due 11:59pm Monday 2/12

Use the same format as previous Homework: in a file called `index.html`, wrap each answer in a <p> element, with any SVG tags in an <svg> element instead of a <script> element. Put your name and netid in the <title>. Put this file in a zip archive.

The goal of this homework is to learn about SVG. **All work should be plain SVG, with NO Javascript**. Some problems require numbers, like pixel positions or descriptive statistics. You may calculate these in any way you see fit (R, excel, Javascript), but they should appear in your turned-in homework as literal numbers. You may *not* use an SVG authoring tool like Adobe Illustrator (no, seriously: we can tell, and it's easier to write from scratch than to edit it to make it look like you did).

1. Create a 200x200 pixel SVG element with the word "Cornell" in red, centered in the exact middle (vertically *and* horizontally), using the Palatino typeface, with a drop shadow for the word. Consult the SVG specification to find out how to change color and font attributes, set text alignment, and add filters and shadows. Put a small orange circle at 100,100 so we can see that your text is centered. If you do not have Palatino, you may use another font to test your code. (20pts)

2. Create a 200x200 pixel SVG element. Reproduce the plot in Figure 2 of the Wickham "Layered Grammar of Graphics" reading using SVG elements. Recalculate the pixel positions for the (x, y) coordinates in Table 2 as necessary. Remember to account for the "padding" pixels below and to the left of the axes. Include axis labels. You do NOT need to include the short tick marks. Table 2 contains data values. Table 3 contains those data values transformed into pixel coordinates. You will need to recalculate these pixel coordinates. The result will not look exactly like Figure 2; we will know what to expect for the data in Table 2. Points intersecting axes are ok. (20pts)

3. Use SVG <path> elements to create a design for the course flag. You must include three enneagrams and position them using the `transform` attribute. You may use any additional shapes or patterns you can think of as long as you implement them using <path> elements. If you use a tool to generate coordinates for shapes, please cite that tool. You must also include the course motto: ESSE ET

VIDERI using a <text> element. Hint: for repeated shapes, write the coordinates once, copy it several times, and then use some combination of translate() and scale() transformations to place them. There will be a small creativity component in grading. (20pts)

4. Make a bar plot that represents the frequency of numbers in this dataset:

```
var samples = [4, 1, 7, 3, 15, 10, 0, 10, 8, 4, 4, 2, 15, 6, 7, 6];
```

The x-axis will correspond to values from the dataset, and the y-axis will correspond to the frequency of those values. Figure out how to map those numbers into pixel coordinates. Consider the following dataset:

A. Make a bar plot of the data values using SVG rectangles. Create one rectangle for each distinct integer in the dataset. Each one should be positioned so that it is centered at the x-axis value that corresponds to its data value. For example, the middle of the bar for "3" should be at the pixel coordinate that corresponds to the value 3. In other words, leave empty space even for values that have no observations: there should be a gap between the bars for 8 and 10. (20pts)

B. Calculate the mean, median, mode, and standard deviation and record those numbers in the <p> tag. You may use whatever tool you like, we only need to see the result. (5 pts)

C. Add vertical lines to the plot corresponding to the mean (in red), median (in blue) and mode (in purple). For the "mean" line, make a line from the top of the figure to the bottom, at the x position in the figure that corresponds to the mean you calculated. (5 pts)

D. Use an SVG rectangle with a semi-transparent fill to show the region covering one standard deviation on both sides of the mean. In other words, make a rectangle from the top of the figure to the bottom that is centered at the mean, and two standard deviations wide. (5pts)

E. Calculate the probability that a randomly selected datapoint is greater than or equal to 4 and record it in the <p> tag. (5pts)