CS/INFO 3300; INFO 5100
Homework 2
Due → **4:59pm** ← Wednesday 2/17

Use the same format as Homework 1: 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, but they should appear in your turned-in homework as literal numbers. You may not use an SVG authoring tool like Adobe Illustrator.

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. 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 blue 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. 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 may not look exactly like Figure 2; we will know what to expect for the data in Table 2. (20pts)

3. Use SVG `<path>` elements to create the Chinese flag (five yellow stars on red). You may substitute another flag as long as it has elements that require a path, not just rectangles (eg Canada, but not France). The flag should be recognizable, but does not have to be precise. Hint: make one star, copy it several times, and then use some combination of translate() and scale() transformations. (20pts, +5 for Brazil)

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

[2, 3, 3, 4, 4, 4, 5, 5, 5, 5, 5, 7, 7, 14, 14]

```
var samples = [7, 4, 5, 3, 14, 5, 7, 3, 4, 2, 14, 4, 5, 5, 5];
```

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 histogram of the data values using SVG rectangles (labels optional). Create one rectangle for each distinct value 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 "5" should be at the pixel coordinate that corresponds to the value 5. In other words, leave empty space even for values that have no observations: there should be a gap between the bars for 7 and 15. (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. If you find that two lines are at the same x position, you can either add a slight offset (this is known as "jitter") or make one of the lines wider than the other. (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 equal to 5 and record it in the <p> tag. (5pts)