**Lab 2**

Projections

**Deliverables:**

1. Questions 1-9
2. Final map layout with the four data frames

**QUESTION 1: What is the difference between the “Project” and “Define Projection” tools?** [1 point]

The Project tool projects spatial data from one coordinate system to another while the Define Projection tool overwrites the coordinate system information (map projection and datum) stored with a data set. It is intended for datasets that have an unknown or incorrect coordinate system defined.

**QUESTION 2: What does the “Geographic Transformation” parameter in the “Project” Tool specify? Is a geographic transformation always necessary?** [1 point]

This method can be used for converting data between two geographic coordinate systems or datums. This optional parameter may be required if the input and output coordinate systems have different datum.

**QUESTION 3: What happens when you project a file in a map that already contains another shapefile (World-GCS)? Why?** [1 point]

Nothing changes until you select the new shape file, because it is displaying the original shape file.

**QUESTION 4: The layout that you created has four data frames. For which of those maps is it appropriate to include a north arrow as the direction indicator? Briefly describe (1-2 sentences) why a north arrow would not be appropriate for the other maps.** [1 point]

North arrows are only appropriate for cylindrical projections or on the central meridian of a conic projection. The Plate Carree projections are cylindrical and therefore north arrows are appropriate for Oregon-GCS and World-GCS. Oregon-Lambert’s central meridian is on Oregon, so a north arrow is appropriate (in the middle of Oregon. A North arrow is not appropriate for World-Lambert because it is conic and there is no clear central place to put it that makes sense.

**QUESTION 5: Which data frames are appropriate to include a scale bar? Why?** [1 point]

Platte Carree projection introduce more distortion the further away you are from the equator. Scale bars are therefore not appropriate for Oregon-GCS and World-GCS. Lambert Conformal Conic projections introduce more distortion the farther south you go. Scale bars are therefore not appropriate for World-Lambert. It is appropriate for Oregon-Lambert because there is less distortion around Oregon.

**QUESTION 6: Which projection/coordinate system works best for each geographic extent (Oregon/World)? Explain.** [3 points]

Platte Carree projection works best for the World, since instead of the south being heavily distorted, there is equal distortion in either direction as you move away from the equator. The Lambert projection is best for Oregon, since it introduces less distortion (Oregon is stretched latitudinally for Oregon-GCS).

**QUESTIONS 7-9 refer to** <http://projections.mgis.psu.edu/>:

**QUESTION 7: Describe the shape of these ellipses in the Mercator projection. Why do they have the shape they do in this projection?** [2 points]

The ellipses are larger in size the farther from the equator they are. This is because this projection is cylindrical while the Earth itself is (roughly) spherical. This means that landmass farther from the equator appear larger.

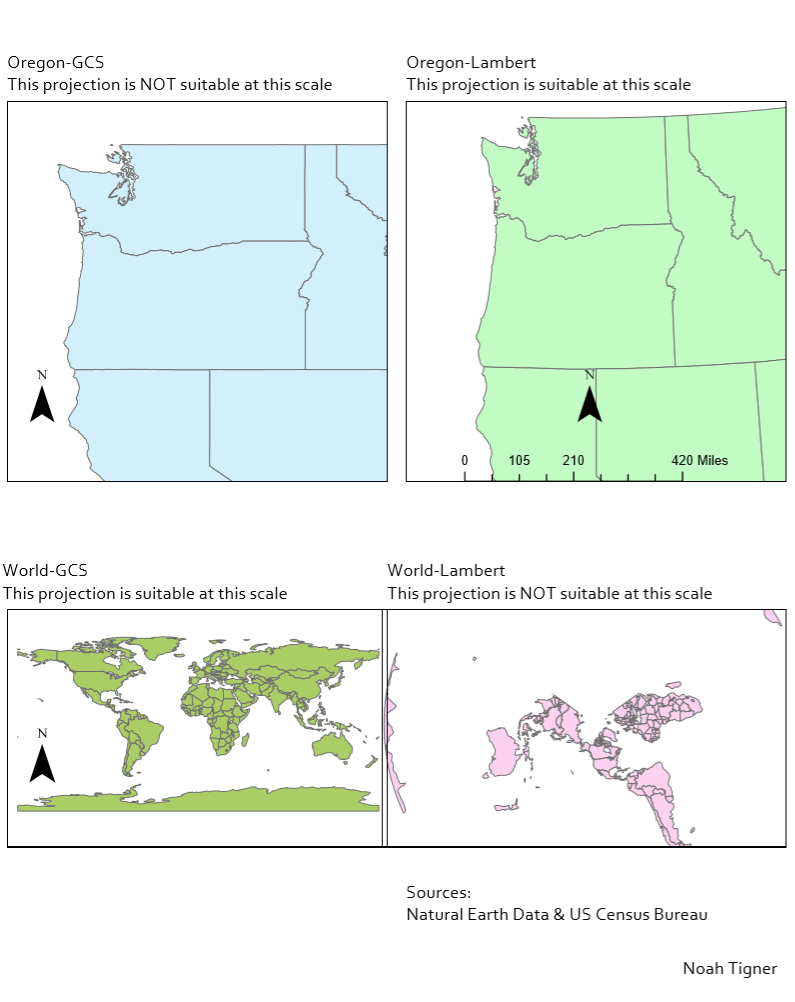
**QUESTION 8: The distortion ellipses are different in this, describe the shape of the ellipses and then explain why that shape is a product of the Lambert Conformal Conic Projection.** [2 points]

The ellipses increase in size the farther south you go. This is because the Lambert projection is conical, and therefore more accurate near the top of the cone (the north of the globe). This means that landmass closer to the south appear larger.

**QUESTION 9: Describe these distortion ellipses and then explain why that shape is a product of the Albers Equal-Area Conic Projection.** [2 points]

The ellipses are stretched lengthwise near the south. This is because the Albers Equal-Area conic projection distorts latitudinally the farther south you go. This means that areas in the south appear wider.

**GRAPHIC 1: Final map layout with the four data frames** [6 points]

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