**Homework 1 Solution**

**GIS in Water Resources**

**Fall 2012**

Prepared by Gonzalo E. Espinoza

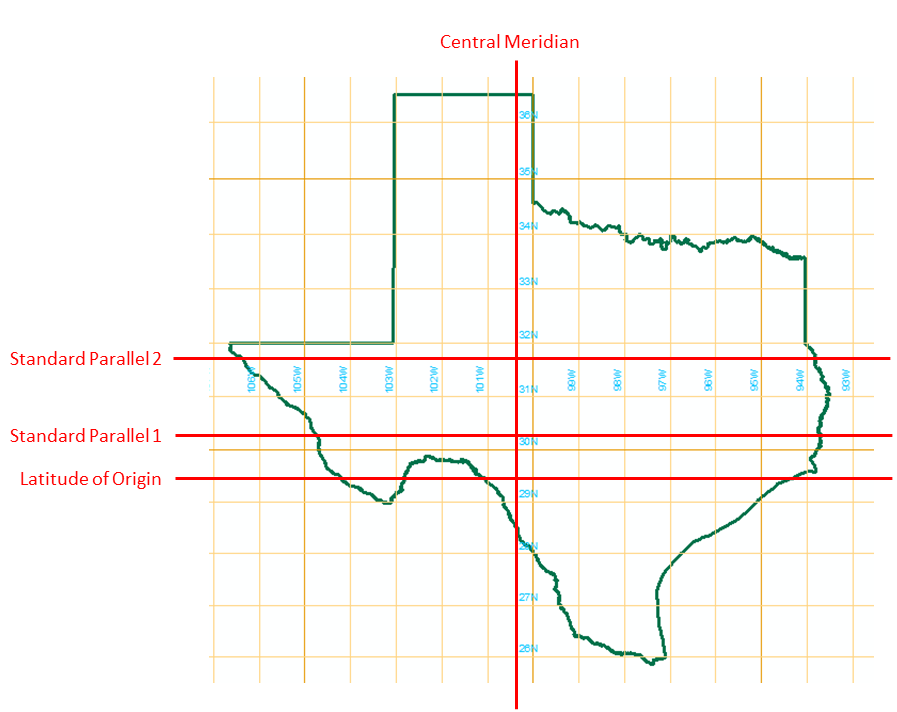
1. *Map Projection Parameters*
2. *What earth datum is used in this coordinate system?*

North American 1983

1. *What map projection is used in this coordinate system?*

Lambert Conformal Conic

1. *Sketch on the map the standard parallels, the central meridian and the latitude of origin of this projection.*



1. *For this projection, what are the coordinates of the origin (φo, λo) (in units of degrees minutes and seconds) and the corresponding (Xo, Yo) (in units of feet?*

1. *Locations on the Earth*

Austin

Logan

Lincoln

Distances on the Earth

1. Logan to Austin

Logan

Austin

1. Austin to Lincoln

Austin

Lincoln

1. Lincoln to Logan

Lincoln

Logan

Slopes

1. Logan to Austin

The water would flow from Logan to Austin

1. Austin to Lincoln

The water would flow from Lincoln to Austin

1. Lincoln to Logan

The water would flow from Logan to Lincoln

1. *Web Mercator Coordinates*

The relationships between the Geographic Coordinates and the Web Mercator Coordinates are the following:

The pair of coordinates in the X direction (Longitude) follows a simple relationship. In contrast, the pair of coordinates in the Y direction does not follow the simple relationship: . This means that for the projection, the X direction is conserved and the error is carried by the Y direction (with a correction). This is because the Mercator is a cylindrical map projection and in the cylinder is oriented from South to North.



1. *Sizes of DEM cells*
2. Austin
3. Logan
4. Lincoln