Homework Set 1

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2/10/2015

1. Distance along a latitudinal circle.  
   1. Distance from 72° W longitude to 55° E longitude…  
        
      D = 111.1111 \* cosd(latitude) \* (72 + 55)  
      1. D at latitude of 0° = 14,111.1 km
      2. D at latitude of 50° = 9,070.4 km
      3. D at the Tropic of Cancer (23.5° N) = 12,940.7 km
   2. Calculate the longitude for the vertical bisector of zone 33.  
        
      Longitude = ((33 - 31) \* 6) + (6 / 2) = 15° E
2. Find the great circle distance between the sets of points.  
     
   D = acos(sin(latA) \* sin(latB) + cos(latA) \* cos(latB) \* cos(longA - longB)) \* 111.1111  
   1. P1: lat. 40° N long. 70° W  
      P2: lat. 40° N long. 60° E  
        
      acosd(sind(40) \* sind(40) + cosd(40) \* cosd(40) \* cosd(-70 - 60)) \* 111.1111  
      D = 9,770.9 km
   2. P1: lat. 20° N long. 145° W  
      P2: lat. 65° N long. 35° E  
        
      acosd(sind(20) \* sind(65) + cosd(20) \* cosd(65) \* cosd(-145 - 35)) \* 111.1111  
      D = 10,555.6 km
3. Find the distance…  
     
   P1: lat. 40° N long. 70° W  
   P2: lat. 40° N long. 60° E  
   1. If one follows a constant of "due West" from P1 to P2.  
        
      D = 111.1111 \* cosd(40) \* (360 - (70 + 60)) = 19,576.7 km
   2. If one follows a constant of "due East" from P1 to P2.   
        
      D = 111.1111 \* cosd(40) \* (70 + 60) = 11,065.1 km
4. Azimuth  
   1. Give the Quadrant bearing angle corresponding to the azimuth angle of 310°  
        
      W 40° N
   2. Find the azimuth angle that corresponds to S 36° W  
        
      216°
5. Projections  
     
   One type of conic map projection is the Lambert conformal conic projection. This projection is widely used by pilots as an aeronautical chart due to the property that straight lines on this projection accurately approximate great-circle routes between two points on the map. This projection method also provides that unit scale deviation between two standard parallels is minimized.  
     
   The azimuthal equidistant projection is a projection that provides proportionately equidistant positioning and maintains the correct azimuth of map points relative to the center. However, the qualities of this projection provides that distance and direction are accurate only to the center point. A common application for this is a polar projection.
6. Geographic Coordinates  
   1. Find a reasonably accurate longitude, latitude for Chihuahua, Mexico  
        
      28.6353° N, 106.0889° W
   2. If you go due East for 180° from 6(a), where in the world are you?  
        
      28.6353° N, 73.9111° E  
      Rajasthan, India
   3. Find a reasonably accurate longitude, latitude for the Cape of Good Hope, near the tip of Arica  
        
      34.3581° S, 18.4719° E
   4. Determine the location of the point antipodal to that in 6(c)  
        
      34.3581° N, 161.5281° W  
      North Pacific Ocean
7. Convert 33.77° to degrees minutes and seconds  
     
   Degrees = integer(33.77) = 33°  
     
   Minutes = integer((33.77 – 33) \* 60) = integer(0.77 \* 60) = integer(46.2) = 46'  
     
   Seconds = (33.77 – 33 – (46/60)) \* 3600 = 12''

= 33° 46' 12''

Main Sources

1. “Lambert conformal conic projection”. Wikipedia: The Free Encyclopedia. Wikimedia Foundation, Inc. 19 Dec. 2014. Web. 2 Feb. 2015. <http://en.wikipedia.org/wiki/Lambert\_conformal\_conic\_projection>
2. “Azimuthal equidistant projection”. Wikipedia: The Free Encyclopedia. Wikimedia Foundation, Inc. 19 Dec. 2014. Web. 2 Feb. 2015. <http://en.wikipedia.org/wiki/Azimuthal\_equidistant\_projection>