Exercise Four for GSDM Seminar

Name: _____

Date: _____

Geodetic Forward and Geodetic Inverse Computations – see www.globalcogo.com/BK8andBK9.xlsx

I. Use BK8 and the following data to compute the local (flat-earth) components of a 3-D vector defined by the following ΔX/ΔY/ΔZ from the SW Corner of Section 31, T23S-R1E to the New Mexico Initial Point – SW Corner, Section 31, T1N-R1E, New Mexico Principal Meridian. (What I really want to know is the azimuth of that line, tan α = Δe/Δn. We should be impressed!)

SW Corner Section 31, T23S-R1E (92)	Vector components to Initial Point
Lat = 32° 15' 24."28753	ΔX = 35,388.175 m
Long = 253° 06' 43."45845 (E)	ΔY = 116,425.368 m
= 106° 53' 16."54155 (W)	ΔZ = 185,935.120 m

II. We set up a total station on Station Reilly at NMSU, back-sighted a known point, then measured (through the window) the zenith angle, slope distance, and azimuth to a reflector sitting in the middle of Associate Engineering Dean Cooper's desk in Goddard Hall. Given the data and observations below, what are the NAD83(11) latitude, longitude, and ellipsoid height of the top of Dean Cooper's desk? This exercise involves several steps & shows the power of the GSDM.

Station: Reilly - NGS data sheet (2011)	Field Observations:
Lat. = 32° 16' 55."93001 (N)	Zenith Direction: 94° 54' 08"
Long. = 106° 45' 15."16035 (W)	Azimuth to desk: 181° 34' 23"
Ellipsoid height = 1,166.543 m	Slope distance: 78.453 m
	HI at Instrument = 1.682 m
	HT at reflector = 0.366 m

Steps:

1. Compute local Δe/Δn/Δu components - BK13 (plane surveying comps.)
2. From those local components, find ΔX/ΔY/ΔZ components to desk - BK9
3. Compute X/Y/Z @ Reilly – BK1 (or get from NGS data sheet)
4. Find X/Y/Z on Dr. Cooper's desk – BK3
5. Using X/Y/Z, determine ϕ/λ/h – BK2.