NAME_____ Score_____

CEEN 113-1 Engineering Measurements
Dr. Nelson
Exam #2 Fall 1996
Use the space given to answer the questions, you may wish to use scratch paper for calculations.
CLOSED BOOK - CALCULATORS REQUIRED

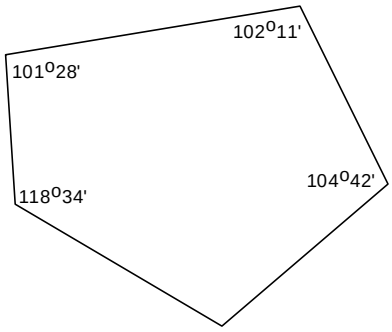
Section I - Answer the following True/False questions by circling either T or F (7 pts)

T F The reverse bearing of a line with a forward bearing equal to N30^{O}E would be S210^{O}W.
T F Latitudes correspond to the east/west component of a line segment whereas departures correspond to north/south.
T F The compass rule is used to compute the area of an n-sided polygon.
T F Contour lines may never cross.
T F A traverse must be closed.
T F In GPS, horizontal accuracy is generally better than vertical accuracy.
T F Closely spaced contours indicate regions of steep slope.

Section II - Short Answer (13 pts)

1. Besides ionosphere and atmosphere, what are two other sources of GPS errors?

2. Determine the missing interior angle.



3. In GPS, how is geometric dilution of precision (GDOP) determined?

4. What are the five fundamental steps/ideas of GPS.

5. If one inch on a map equals 100 yards on the ground, what is the representative fraction (RF) for the map?

Section II - Problems (80 pts)

A. You are asked to make preliminary measurements at a site prior to design and construction. You need to determine the limits of the boundaries on the site, the total area enclosed and other basic topographic detail, including contours. You and your crew go to the site, occupy each property corner, and make the necessary measurements for your calculations and map. You return to the office and reduce your notes to the following information (in feet) (50 pts):

Point	*Northing (Y)*	*Easting (X)*	*Elevation (Z)*	*Feature*
N.W. Corner	1000.00	1000.00	4410.3	Ridge
N.E. Corner	880	1320	4400.5	Ditch
#1	924	1184	4403.0	
#2	894	1106	4398.3	Ditch
#3	780	1100	4405.6	Tree
#4	885	1020	4400.5	Tree
S.E. Corner	540	1340	4401.0	
#5	742	1320	4403.9	
#6	804	1200	4411.5	Ridge
#7	855	1180	4406.1	
S.W. Corner	580	840	4397.0	Ditch
#8	580	1120	4400.7	
#9	610	1170	4402.1	
#10	710	1160	4404.2	Tree
#11	620	1290	4408.6	Ridge
N.W. Corner ‘	999.88	1000.07	4410.3	Ridge
#12	790	940	4399.1	
#13	680	930	4397.5	Ditch
#14	690	1060	4402.3	
#15	610	1010	4400.0	

Show your answers on this sheet, even if you do your work on another sheet.

1. Calculate the bearings (degrees-minute-seconds), distances(feet) and grades (percent) of the construction boundaries. The grade is the change in elevation divided by distance as a percent. (16 pts)

   a) N.W. --> N.E. Bearing_____ Distance_____ Grade_____

   b) N.E. --> S.E. Bearing_____ Distance_____ Grade_____

   c) S.E. --> S.W. Bearing_____ Distance_____ Grade_____

   d) S.W. --> N.W. Bearing_____ Distance_____ Grade_____

2. Calculate the area of the construction site (sq. feet). (10 pts)

   Area_____.

3. What is the bearing and distance of the closing vector (N.W. Corner’ -> N.W. Corner): (4 pts)

   Bearing_____ Distance_____

4. What is accuracy ratio of the survey expressed as a fraction with a numerator of 1? (2 pts)

   Accuracy Ratio _____

5. The length of fence required to enclose the boundary of the construction site (in feet). (3 pts)

   Length_____.

6. Make a pre-design map on this sheet by plotting the given points in their correct locations, drawing linearly interpolated four-foot contours beginning at 4400, and including appropriate labels and other map information. (15 pts)

B. For the section of contour map shown below answer the following questions (10 pts):

a) What is the approximate grade along the path from the point where First Left and First Right Forks split off of Rock Canyon to the edge of the Rock Canyon Picnic Area?_____.

b) Which is higher Y Mountain or Squaw Mountain? Is this the highest point on the map?

c) Draw a line from the peak marked by an X to the Rock Canyon Picnic Area along a direct path that has the mildest slope. In other words your path should be perpendicular to contours along the mildest slope possible (no switch-backs).

d) In which direction (North, South, East, West, etc.) does the First Right Fork flow?

e) What is the contour interval of this map?

C. For the bearings and distances shown in the table below, compute the azimuths, latitudes and departures (show proper signs). Then determine the latitude and departure for DA as well as its distance, bearing (closest minute), and azimuth. HINT: It may help if you plot the given information of the traverse first. (20 pts)

Course	*Distance*	*Bearing*	*Azimuth*	*Latitude*	*Departure*
AB	261.27	N31^{O}22'E			
BC	322.78	N79^{O}11'E			
CD	517.66	S19^{O}59'W			
DA					