

NAME _____

Score _____

CEEN 113 Sections 1-6 Engineering Measurements Dr. Nelson Exam #1 Fall 2000
October 2-4 (Late fee on October 4th)

OPEN BOOK (not notes and homework) - CALCULATORS REQUIRED

Any answer requiring an angle should be given in Degrees-Minutes-Seconds format.

2 HOUR TIME LIMIT (10 Minutes grace is given before computing a penalty, yes this really makes it a 2 hr 10 minute time limit, but after that the penalty is stiff) - Penalty is 1 pt per 2 minutes over.

You have approximately 6 minutes per problem (some will take a little longer, others much shorter), so be sure to pace yourself. If you can't answer a problem right away move on so that you can be sure to answer as many problems as possible. For the most part these problems are all or nothing so be careful. Clearly identify your answer, but I still suggest you show your work.

Each problem is worth 5 pts (the last problem is three parts and is worth 15 pts). The numbers in parenthesis are the competencies being tested from the class list (you do not need to worry about them, they are there so that we can measure how well you are learning the course objectives/competencies).

1. (7.4) What is the probable error of the perimeter of a five-sided traverse, if the probable errors for each of the five sides are: 0.04, 0.08, 0.07, 0.15, and 0.015?

Plus or minus 0.19

2. (7.4) A distance of 543.64 meters is measured with a 30 meter tape that has a calibrated length of 29.96 meters. What is the corrected distance?

542.92 m

3. (2.1.2) Sketch and identify the interior angles B and C of **two** triangles for which side a=12 meters, side b=31 meters, and angle A = 20°30'? **Hint: Remember that angle A is opposite side a and Angle B is opposite side b, etc.**

B = 64°47' or 115°13'
C = 94°43' or 44°17'

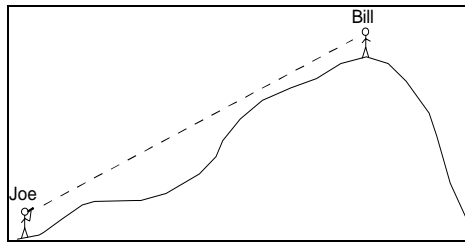
4. (7.4) On a large lake without waves, how far (in km) from shore is a sailboat when the top of its 15-meter mast disappears from your view if your eye height is 1.6 meters?

19.8 km

5. (9.1) In measuring an angle by repetition, the reading after the first turning in a direction positive was 94°10'00". The reading after the fourth turning is 16°39'36". Determine the angle measured.

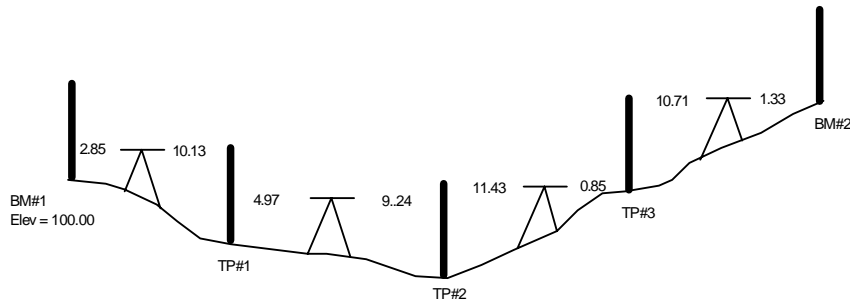
94°09'54

6. (7.4) Using a clinometer, Joe measures a 42° vertical angle to Bill standing on top of a nearby hill. It took Bill 437 paces to get to the top of the hill and 445 paces coming back. If Bill's calibrated pace is 2.81 ft/pace, what is the approximate height of the hill Bill climbed from where Joe stands?



830 ft.

7. (7.3) Set up and complete the differential level notes for the information shown in the accompanying illustration. All backsights are shown to the left of the instrument diagrams and foresights are shown to the right. All units are feet.



Elevations
 100 (BM1)
 92.72 (TP1)
 88.45 (TP2)
 99.03 (TP3)
 108.41 (BM2)

Don't forget
 arithmetic check!

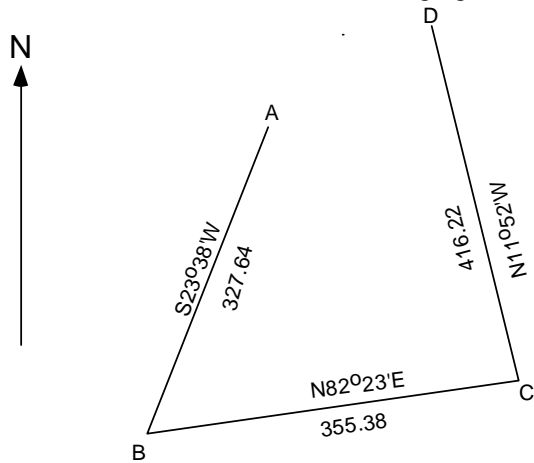
8. (7.4) During a level circuit you cover a distance of 12345.88 feet and have a vertical error of .235 feet. What classification is your level circuit survey according to the equations in section 7-11 of your book?

Rough

9. (7.4) Balance the following interior angles of a six-sided closed-polygon traverse. $A = 89^\circ 16'$, $B = 91^\circ 25'$, $C = 101^\circ 29'$, $D = 156^\circ 13'$, $E = 196^\circ 44'$, $F = 84^\circ 56'$.

$A = 89^\circ 15' 30''$
 $B = 91^\circ 24' 30''$
 $C = 101^\circ 28' 30''$
 $D = 156^\circ 12' 30''$
 $E = 196^\circ 43' 30''$
 $F = 84^\circ 55' 30''$

Questions 10 to 13 refer to the following figure



10. (2.1.2) What are the interior angles at B and C?

B = $58^{\circ}45'$
C = $85^{\circ}45'$

11. (2.1.2) Compute the Latitudes and Departures for AB, BC, and CD

Line	Lat	Dep
AB	-300.16	-131.35
BC	47.10	352.24
CD	407.32	-85.59

12. (2.1.2) Compute the latitude and departure for DA (there is no need to balance departures here, you can't because it is not a closed traverse)?

Lat DA = -154.26
Dep DA = -135.30

13. (2.1.2) What is the bearing of DA?

S41°15'13"W

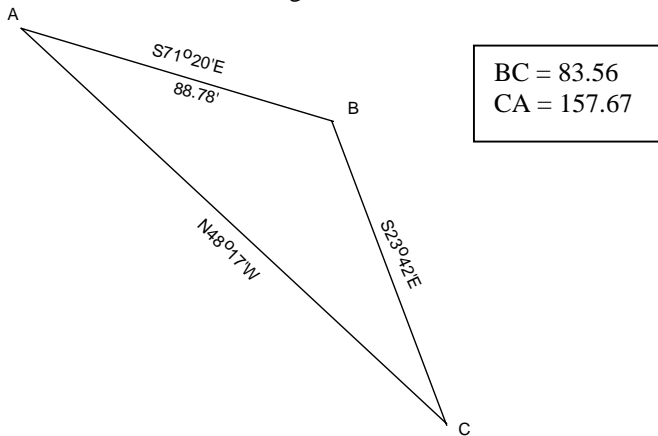
14. (7.4) What is the precision of a traverse if your linear error of closure is .38 feet and the perimeter of the traverse is 1126.54 feet?

1/2960

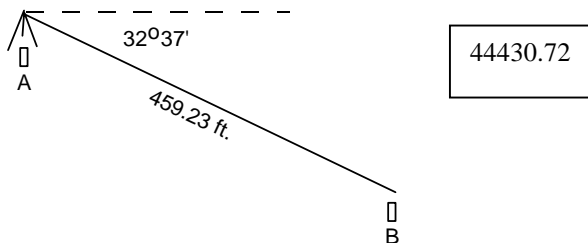
15. (2.1.2) The **true** bearing of an angle is $N88^{\circ}28'W$ and the magnetic declination at the time the angle was measured is $1^{\circ}30'$ West. What is the **magnetic** bearing of the angle? If the magnetic declination changes to 2° West, what will the **magnetic** bearing be?

$N86^{\circ}58'W$
 $N86^{\circ}28'W$

16. (2.1.2) Compute the lengths of BC and CA, given the bearings AB, BC, and CA shown on the diagram below and that the length of AB is 88.78 feet.



17. (9.1) Given a slope distance measurement of 459.23 feet with a vertical angle of $-32^{\circ}37'$ as shown in the diagram below, compute the elevation of point B if the elevation at A is 4678.25 feet.



18. (2.1.2) Compute the error of linear closure, the precision of the traverse, balanced latitudes and departures, and the adjusted bearings (the bearings AB, BC, CA to the nearest second after balancing the latitudes and departures) for the following closed polygon traverse. **Hint: Be sure and try to sketch the closed polygon.**

Line	Length (m)	Departure (m)	Latitude (m)
AB	645.96	-613.60	201.88
BC	1420.46	-504.75	-1327.75
CA	1587.74	1118.86	1126.53

$EL = .834$
 $P = 1/4380$

Line	Lat	Dep
AB	-613.69	201.76
BC	-504.95	-1328.01
CA	1118.64	1126.24

Bearings
 $AB = N71^{\circ}48'03''W$
 $BC = S20^{\circ}49'06''W$
 $CA = N44^{\circ}48'22''E$