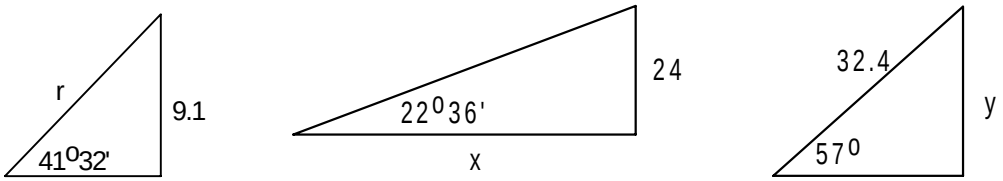
NAME_____ Score_____

CEEN 113-1 Engineering Measurements Dr. Nelson Exam #1 Fall 1998
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 8 minutes per problem, 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.

1. (6 pts) Solve for r, x, and y in the right triangles shown below.



ANSWER r = _____x = _____ y = _____

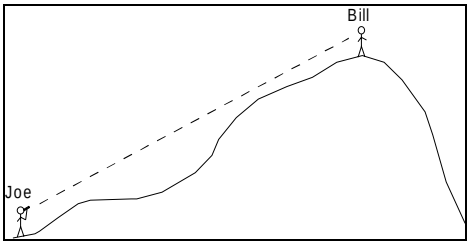
2. (4 pts) A distance of 782.34' is measured with a 100' tape that has a calibrated length of 99.98'. What is the corrected distance?

ANSWER_____

3. (5 pts) After zeroing your vernier scales while sighting at point A you turn an angle of $63^0$12'36" to point B. You then repeat this measurement five additional times and the final reading is $19^0$15'24". What is the most correct measurement of the angle from A to B?

ANSWER_____

4. (5 pts) Using a clinometer, Joe measures a 33^o vertical angle to Bill standing on top of a nearby hill. It took Bill 436 paces to get to the top of the hill and 427 paces coming back. If Bill's calibrated pace is 2.73 ft/pace, what is the approximate height of the hill Bill climbed from where Joe stands?

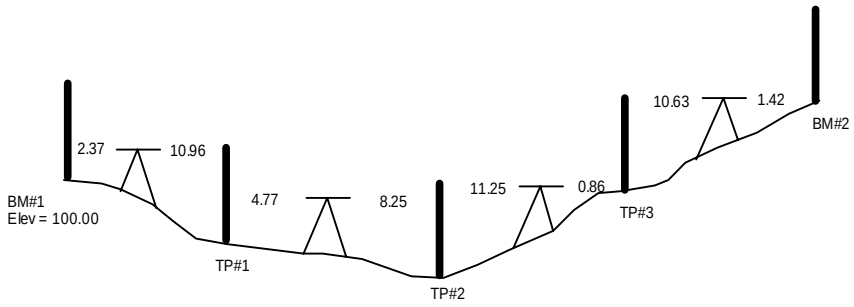


ANSWER_____

5. (8 pts) Complete and check the level notes shown. All units are in meters.

Point	B.S.	H.I.	F.S.	Elev.
BM #1	7.432			864.384
TP #1	7.121		1.862	
TP #2	6.946		6.733	
TP #3	5.397		6.491	
TP #4	4.312		4.682	
BM #2			5.111	

6. (8 pts) 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.



7. (7 pts) During a level circuit you cover a distance of 3981.23 feet and have a vertical error of .021 feet. What classification is your level circuit survey according to Table 8-3?

ANSWER_____

8. (5 pts) The initial reading on your directional theodolite is $236^0$27'32" and after turning an angle clockwise (the reading on the micrometer gets larger when turning your theodolite clockwise) you read $112^0$04'39". What is the interior angle that you have just measured?

ANSWER_____

9. (10 pts) You are using stadia to make measurements. The upper stadia hair has a reading of 7.49 feet and the lower stadia hair has a reading of 3.87 feet on the distant rod. The zenith angle to the center cross hair measures 81°42'18" and the center cross hair is on 5.68 feet.

   What is the horizontal distance between instrument and rod?

ANSWER_____

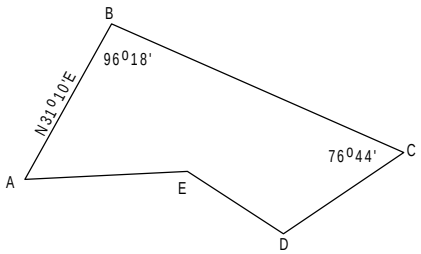
   What is the difference in elevation between the ground directly under the instrument and the ground base of the rod (the instrument height is 5.68 ft.)?

ANSWER_____

10. (7 pts) Two sides and the included angle of a triangle are 1610.462 m, 1262.82 m, and 57°41'23" respectively. Compute the length of the remaining side and the other two angles?

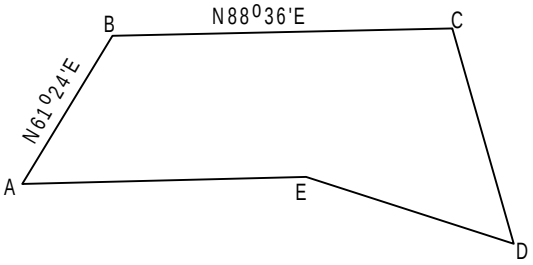
SIDE_____ ANGLE_____ ANGLE_____

11. (10 pts) With the bearing of line AB and the interior angles at B and C given in the diagram below, compute the bearing of line BC and the azimuth of line CD.



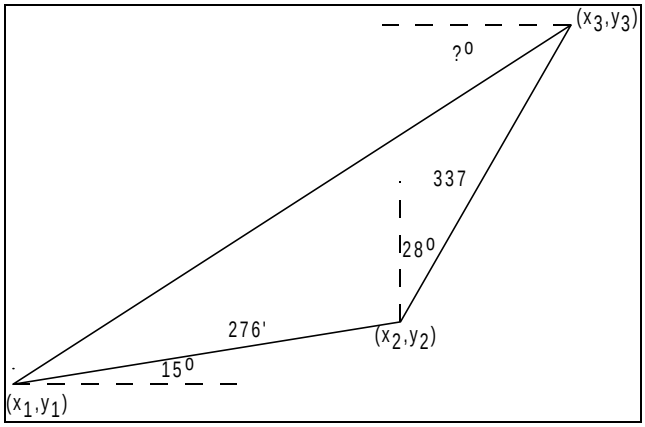
Bearing BC _____ Azimuth CD _____

12. (5 pts) Given the bearings for lines AB and BC determine the interior angle at B.



Interior Angle B _____

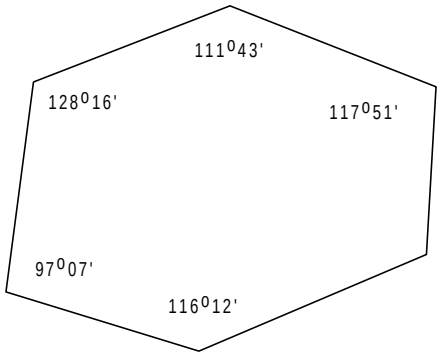
13. (8 pts) In the following diagram (x_1,y_1) = (316.6, 257.9). Determine (x_2,y_2), (x_3,y_3) and the polar coordinates of the vector between (x_1,y_1) and (x_3,y_4)



(X2,Y2)_____ (X3,Y3)_____

Missing Angle ?°_____ Distance from (X3,Y3) to (X1,Y1)_____

14. (3 pts) What is the missing interior angle of the closed traverse shown below?



Missing Angle _____

15. (10 pts) With reference to the figure shown below, a top-mounted EDM is set up at station A where the elevation is 2649.28 ft. Using the following values, compute:

a) the horizontal distance from A to B:

ANSWER_____

b) the elevation at B

ANSWER_____

Given: The optical center of the theodolite is 4.89 ft (hi) above station A. An angle of -18°32'41" was measured to the target, which was 3.76 ft. above station B. The EDM center is .33 ft (Δhi) above the theodolite and the reflecting prism is 1.25 ft. (ΔHR) above the target. The slope distance was recorded as 2138.67 ft. (Some of the dimensions in the figure have been exaggerated in order to help visualize the relationships).