CEEN 113-1   Engineering Measurements   Dr. Nelson   Exam #2 Fall 1998
OPEN BOOK (not notes and homework) - CALCULATORS REQUIRED
Show your work in the space provided, but I will be looking primarily at the answers.
Any answer requiring an angle should be given in Degrees-Minutes-Seconds format.

1. (20 pts) For the vertical curve shown below determine the required elevation and or station information listed on the answer sheet. g_1=-6%, g_2=+2%, the PVI is at station 49+25 at an elevation of 550.97, and the length of the curve is 800 feet.

L = 800 ft
BVC
g_1=-6%
EVC
g_2=+2%
PVI
Station 49+25
Elevation = 550.97
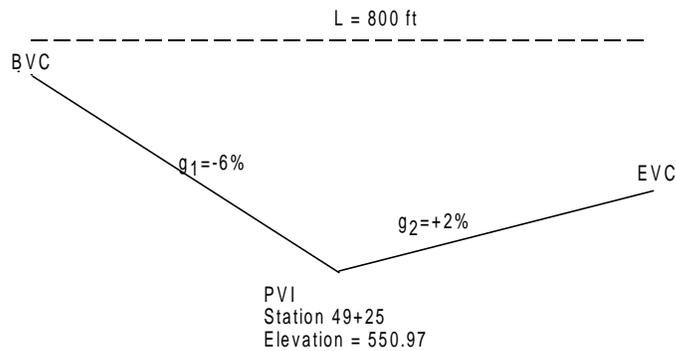
a) Station 47+50.00 is at elevation = _____.

b) Station 52+95.00 is at elevation = _____.

c) Station 48+77.23 is at elevation = _____.

d) Station and Elevation of the low point on the curve _____.

e) Elevation 561.47 is at station(s) _____.

2. (10 pts) Given the information shown in the figure below with the XY coordinates of A = (1000.00, 1500.00), and B=(500.00, 700.00) AC = 640.32 ft and BC = 948.68 ft. Determine the coordinates of C, and the angle β which you must turn while set up over C from A to True North. You must show your work for this problem in the space provided on the answer sheet.
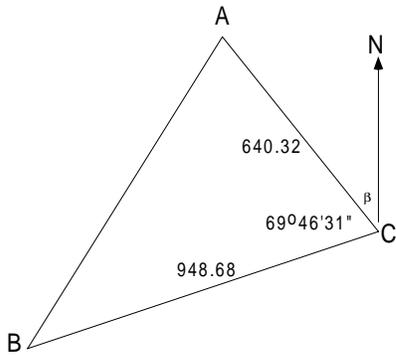
3. (20 pts) For a horizontal circular curve, the P.I. is at station 64+32.2, Δ is 24°20', and the degree of curve D is 4°. Compute the following curve information:

a) R _____.

b) BC _____.

c) EC _____.

d) Deflection angle and long chord at station 62+00 _____.

e) Deflection angle and long chord at the EC _____.

4. (10 pts) In order to satisfy safe driving conditions it has been determined that a compound circular (horizontal) curve should be constructed. You are given the following information about the curve: PI @ 8 + 62.85, Δ_1 = 13°26', Δ_2 = 9°38', R_1 = 645 ft. and R_2 = 495 ft. Determine the stationing of the BC and EC. HINT: See page 272 of your text for a diagram and explanation of variables if you cannot remember.

a) BC _____.

b) EC _____.

5. (20 pts) Bearings and lengths for each of the four segments in the closed-polygon traverse shown below are given in the following table:

Course	Bearing	Length	Latitude	Departure
AB	N8°17'E	404.03		
BC	N87°02'E	622.13		
CD	S14°47'W	653.16		
DA	N68°43'W	550.94		
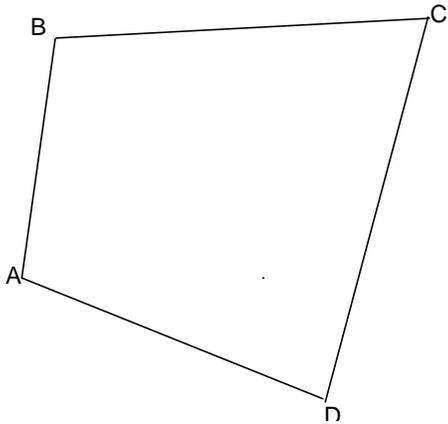
Compute:

a) Unbalanced departures and latitudes (enter in table above).

b) Linear error of closure _____.

c) Accuracy ratio _____.

d) Balanced latitude _____ and departure _____ of segment AB using the compass rule.

6. (20 pts) Using the following set of field notes determine the slope intercepts on both the left and right side of the roadway centerline and then compute the cross-sectional area. The roadway for this cross section is a 30-ft wide level roadbed with fill slopes of 2.5:1 and a sub-grade elevation at centerline of 971.50 ft. The back side of this paper can be used to draw the cross section to scale if you prefer that method.

HI = 969.31		5.2	3.8	7.2	5.4	7.6	8.1	
	Left	50	22	CL	12	30	50	Right