NAME_____ Score_____

CEEN 113 Engineering Measurements Dr. Nelson Exam #2 Fall 1999
OPEN BOOK & LAB MANUAL (not notes and homework) - CALCULATORS REQUIRED
Show your work in the space provided, but for the most part I am grading your answers.
2 hour 30 minute time limit (1 point for each two minutes over will be deducted).
Any answer requiring an angle should be given in Degrees-Minutes-Seconds format.

1. Determine the deflection angle Δ (I) for a proposed horizontal curve if the bearing from the BC to the PI is S79°21'E and the bearing from the PI to the EC is S23°41'W (5 pts).

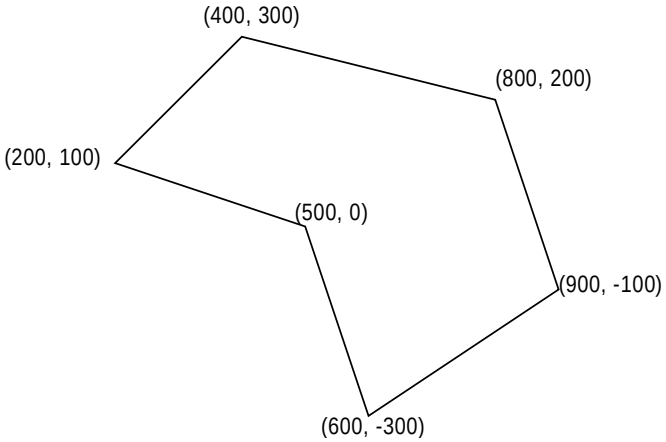
   103°02'

2. A grade of -4% passes station 28+00 at an elevation of 423.15 ft.. A grade of +2% passes through station 38+00 at an elevation of 419.85 ft. Compute the station and elevation of the PV for the unequal-tangent vertical curve (5 pts).

   Station 31+88.33 @ elevation 407.62

3. Compute the area (in sq. feet) of the polygonal area shown below (all coordinates are in feet) (5 pts).

205,000 sq. feet



4. For a horizontal circular curve, the P.I. is at station 64+27.46, Δ (I) is 8°24', and the degree of curve D is 2°00' (arc definition). Compute the following curve information: (20 pts)

   a) R 2864.79

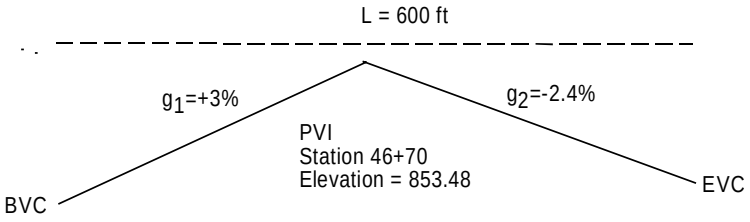
   b) BC 62+17.08

   c) EC 66+37.08.

   d) Deflection angles for all even 100 foot stations.

63+00	0°49’45”
64+00	1°49’45:
65+00	2°49’45”
66+00	3°49’45”
66+37.08	4°12’

5. For the vertical curve shown below determine the required elevation and or station information listed on the answer sheet. g_1=+3%, g_2=-2.4%, the PVI is at station 46+70 at an elevation of 853.48, and the length of the curve is 600 feet (20 pts).



a) Station and elevation of the BVC = 43+70 844.48.

b) Station and elevation of the EVC = 49+70 846.28

c) The elevation at station 45+50 = 848.42.

d) Station and Elevation of the high point on the curve 47+03.33 849.48.

6. Two street curb lines intersect with Δ (I) = $71^{o}36'$. A curb radius must be selected so that an existing catch basin (CB) will abut the future curb. The curb-side of the catch basin center line is located from the PV at a distance of 8.713 m. at an angle of $21^{o}41'$. Compute the radius that will permit the curb to abut the existing catch basin (15 pts).

29.96

7. The following information with respect to the diagram shown below is known (The diagram is not to scale and is only an approximation):

   Angle x is $48^{o}53'12''$, and angle y is $41^{o}20'35''$

   X_A=5721.25, Y_A=21802.48, X_B=12,963.71, Y_B=27,002.38, X_C=20350.09, Y_C=24,861.22 ft.

   Using the 3-point resection method compute the coordinates at point P (25 pts).

   Some important equations that will be helpful include:

   J = g + h = 360 - x - y - R

   $$\tan(h) = \frac{\sin(J)}{K + \cos(J)}$$

   where: $K = \frac{\sin(x)}{\sin(y)} \frac{\overline{BC}}{\overline{AB}}$

   Xp = 14,377.21
   Yp = 16,011.05