

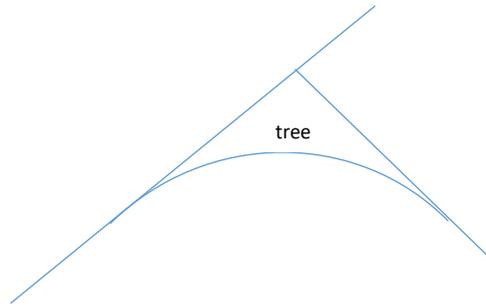
CMCE2322
Survey II/Route Surveying
Midterm Exam
Spring 2021
Smith

Read all questions carefully before answering. Show all work neatly for credit. Upload your completed exam to Blackboard.

DUE: 11:59pm Sunday, March 28th

- (12 pts) A total station is set up over an occupied point (A). The surveyor sights a known point B, and turns an angle right of 164.5472° from point B to point C and measures the horizontal distance AC. What are the coordinates (northing, easting) of C? Draw a sketch showing the approximate locations of the three points relative to (0,0) (X/Y axis).
Given: Coordinates of A: N 121.13, E 312.27
Bearing of line BA: S $51^\circ 32' 42''$ W
Horizontal distance measured (AC): 314.21 ft
- (12 pts) A total station is set up over an occupied point (C) with a known elevation of 27.61'. The surveyor turns to the prism pole at point D, aims at the prism, and takes a measurement. If the height of the instrument is 5.17', the height of the prism pole is 6.20', the horizontal distance CD is 54.11', and the resulting elevation at D is 3.05', what was the zenith angle measured?
- (12 pts) A topographic map has a scale of $1'' = 60'$. If a rectangular parcel of land measures $2 \frac{5}{8}''$ by $6 \frac{5}{8}''$ on the map, what is the area of the parcel in square meters on the ground?
- (12 pts) A topographic map has a scale of $1'' = 20'$ and contour lines at 10' intervals. If the perpendicular distance between the 140' elevation line and 150' elevation line measures $1 \frac{1}{2}''$ on the map, what is the horizontal distance on the ground (in feet) from the 150' line to the (theoretical) elevation of 148'?
- (14 pts) Calculate the chord lengths and deflection angles to stake out the following simple highway curve at half stations (50 ft). Set up the table for the field notes as we did in class.
Given: R = 550'
 $\Delta = 74^\circ 35' 30''$
PI at station 5+21.00

6. (12 pts) In order to avoid damaging a historic tree, the external distance (E) of the curve below must not be less than 43 ft. If $\Delta = 38^\circ 32' 24''$ and the station of the PI is $62 + 48.25$, calculate the D_a , R, and T of the sharpest curve which fits the design requirements.



7. (14 pts) The design for a simple roadway curve calls for $\Delta = 27^\circ 10' 12''$, $D_a = 2^\circ 00' 00''$, and a PI at station $31 + 26$. Solve the curve for L, L_C , T and the stations of the PC and PT.
8. (12 pts) Using the data from example 7, the contractor is required to install curbs $27'$ right of the centerline of the curve (see diagram below). Calculate the values of R, T, L, L_C , D_a , and the new stations of the PC and PT for the offset curve. Note that the intersection of the tangents (Δ) does not change.

