ITCM 310 - Plane Surveying
**EXAM #1 [50 points total]**

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Please Print

9/18
82

Questions 1 - 5: 2 points each

1. List four types of surveys.

a. Topographic
b. Control
c. Route
d. Photogrammetric

2. ~~N~~G.S stands for: Natl. Geologic Survey -2

3. What classification of surveying "best" describes the methods used in this class? [Hint: plumb lines are considered parallel in this classification.]

Plane Surveying

4. Surveying is both an art and science. What is "art" and what is "science" in surveying?

*Art:* holding plumb bob straight

*Science:* book knowledge

5. List five (5) types of information that a surveyor would note or write in his or her field notes.

Station
+ sight
- sight
Height of Instrument
Elevation
Temperature
Group Members
Date
Crew Chief

6. (10 pts.) The values 42.99, 43.71, 45.55, 46.10, and 47.67 feet were measured for the same distance by different surveying crews. Calculate the $E_{90}$ value and show the probable range of values. Show your work and continue on the back of this sheet if necessary.

AVG = 45.204

1.645

(5.4)

45.204 - 42.99 = 2.214
45.204 - 43.71 = 1.494
45.55 - 45.204 = 0.346
46.10 - 45.204 = 0.896
47.67 - 45.204 = 2.466

7.416

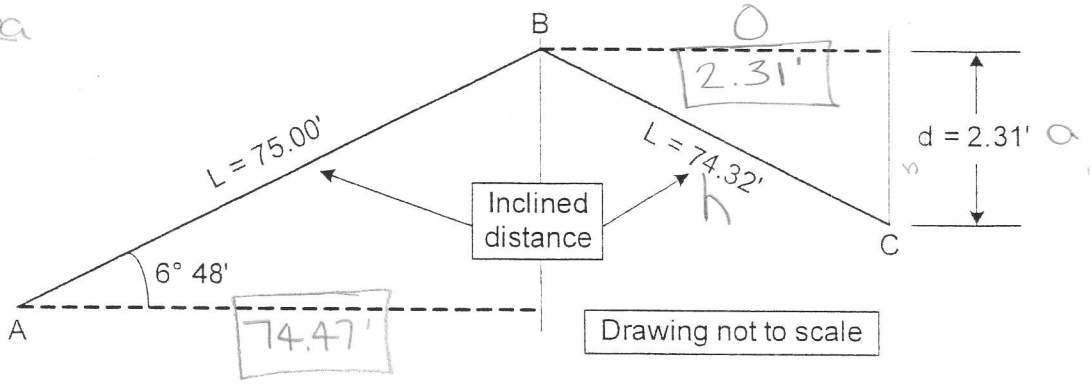
1.483

1.645 √(1.483)(20)

$E_{90}$ = 8.959

7. (10 pts.) The profile or elevation view of two slopes is shown in the figure below. The distances given are sloped or inclined distances. Calculate the total **horizontal distance (dashed lines)** between points A-B and B-C. Show your work.

SOH CAH TOA




cos θ slope dist

cos(6.8)(75) = 74.47'

$\frac{2.31}{74.32}$

$\cos \frac{2.31}{74.32} \cdot 2.31$

2.31'

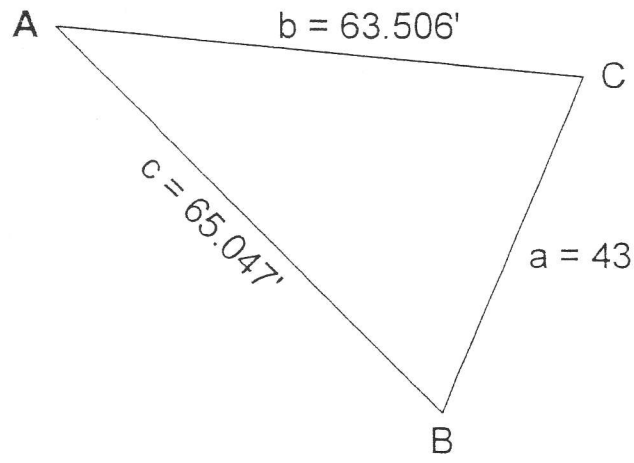
8. (5 pts.) The required relative accuracy for a geometrically closed differential leveling survey is 1:5.000'. If the leveling survey perimeter (horizontal distance) is 750.000 feet, what is the **maximum error of closure** for the circuit to 0.001' significance? Show your work.

$\frac{1}{5000} = \frac{x}{750.00}$ .001

$\frac{5000x}{5000} = \frac{750.000}{5000}$

1 : 0.150'

9. (5 pts.) Determine the value (magnitude) of **angle A** in the figure shown below to an accuracy of 0° 00' 01". Show the formulas used and your work. [*Hint:* triangle ABC does not contain a right angle.]




$\frac{a^2+b^2-c^2}{2ab}$

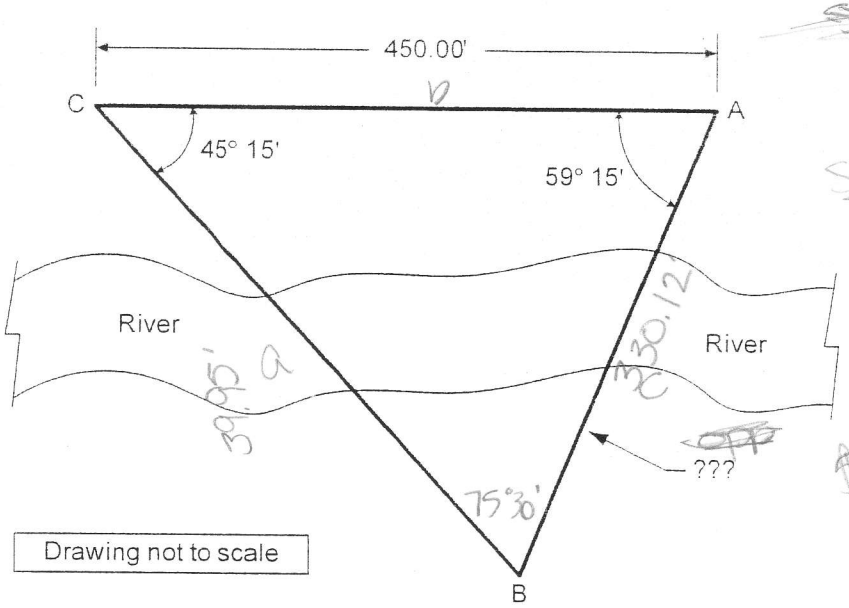
$\cos A \quad \frac{b^2+c^2-a^2}{2bc}$

COSA = 39° 48' 45.09"

$63.506^2 + 65.047^2 - 43.794^2$

$2(63.506)(65.047)$

10. (10 pts.) To determine the distance between points A and B on the opposite sides of a river, a surveyor measures a distance of 450.00 feet between points A and C, where C is set on the same side of the river as A. Angle A is measured to be 59°15' and angle C is measured to be 45°15'. **Compute the distance of line AB (also can be denoted as line 'c').** Show the formulas used and your work. [*Hint:* triangle ABC does not contain a right angle.]




$\frac{\sin A}{a} = \frac{\sin B}{b}$

$\frac{\sin A}{a} = \frac{\sin B}{b}$

$\frac{.9681}{450} = \frac{.7102}{c}$

$\frac{.9681}{450} = \frac{.8594}{a}$

$\frac{.9681c}{.9681} = \frac{319.59}{.9681}$

$\frac{.9681a}{.9681} = \frac{38.673}{.9681}$

$c = 330.12'$

$a = 39.95'$