

**CVG 2171 (Surveying and Measurements)**  
*Mid-Term Exam (March 8<sup>th</sup>, 2017)*

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Duration: 1 hr. 20 min

**Closed Book Examination**

Electronic calculators are permitted

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**Professor: A. Skaff**

1. (10 points)

A 100-ft steel tape weighs 2 lb., has a cross-section area of  $0.006 \text{ in}^2$ , and is 100.00 ft. long when standardized at  $68^\circ\text{F}$  and 12 lb. pull and supported throughout its entire length. A distance is measured in the field with this tape and found to be 688.32 ft. If, at time of measurement, the pull on the tape was 20 lb., the temperature was  $88^\circ\text{F}$  and if the tape was supported only at its ends, what is the correct distance measured? Assume all full tape lengths except the last one.

2. (10 points)

Prepare a set of level notes for the data shown below and make the customary arithmetic check. The elevation of BM 77 is 131.275 m.

<u>Station</u>	<u>BS (m)</u>	<u>FS (m)</u>
BM 77	2.720	
TP1	0.503	2.892
TP2	0.212	3.056
BM 78	1.246	3.302
TP3	2.169	1.257
TP4	2.695	0.678
BM 79		0.202

3. (10 points)

Given the following data for a closed traverse ABCDEA, compute the length and the azimuth of side DE.

Segment	Length (m)	Azimuth
AB	309.72	86°41'
BC	201.44	89°33'
CD	235.70	204°24'
DE	Unknown	Unknown
EA	359.10	316°32'

Good luck,

**USEFUL EQUATIONS**

$$C_1 = \frac{(l - l')}{l'} L$$

$$\text{departure} = L \sin \alpha$$

$$\text{latitude} = L \cos \alpha$$

$$C_1 = K(T_1 - T) L$$

$$\tan \text{azimuth (or bearing) } AB = \frac{\text{departure } AB}{\text{latitude } AB}$$

$$C_p = (P_1 - P) \frac{L}{AE}$$

$$\text{length } AB = \frac{\text{departure } AB}{\sin \text{azimuth (or bearing) } AB}$$

$$= \frac{\text{latitude } AB}{\cos \text{azimuth (or bearing) } AB}$$

$$= \sqrt{(\text{departure } AB)^2 + (\text{latitude } AB)^2}$$

$$C_s = -\frac{w^2 L_s^3}{24P_1^2} = -\frac{W^2 L_s}{24P_1^2}$$

$$HI = \text{Elev.} + BS$$

$$\text{Elev.} = HI - FS$$