Faculty of Engineering

Prince of Songkla University

Final Examination 1st Semester 2004

Subject: 220-361 Survey II	Room: A400
Date : October 10th , 2004	Time: 9:00 – 12:00

Instructions

1) There are 5 problems in the examination. (100 points)

2) Attempt all problems.

3) Books and Lecture Notes are not allowed.

4) Student may use an electronic calculator.
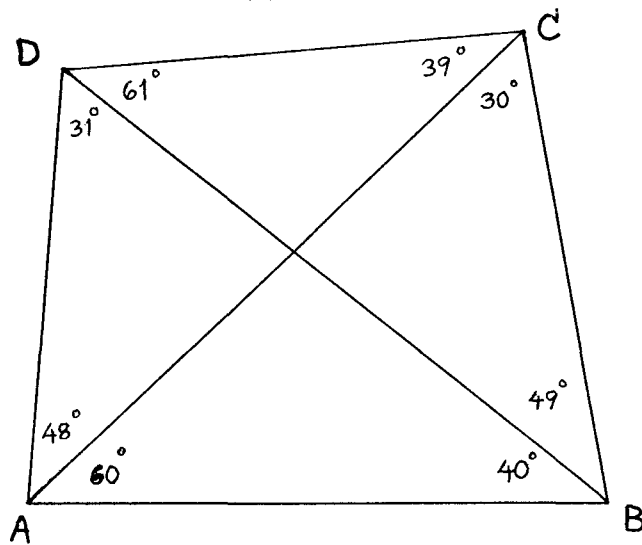
5) Student may also bring in a dictionary.

นาย รุจ ศุภวิไล

ผู้ออกข้อสอบ

1) A 200-m. equal tangent parabolic curve is to be placed between grades of g_1 = 1.25% and g_2 = -2.75% intersecting at station 18+000, which has an elevation of 270.190 m. above MSL. Calculate elevations at even 20 m. stations on the vertical curve and determine the station and elevation of the highest point on the curve. (20 points)

2) Sketch the celestial body in the Right Ascension system with all necessary details. Display all information required in defining the primary and secondary reference planes of this spherical coordinates system. (20 points)

3) From the given quadrilateral ABCD as shown, compute the strength of figure of all possible routes that can be used to compute the length of unknown side CD from the length of the base line AB. (20 points)

Hint: Use the attached table 10.3.

4) Name and explain types of circular arcs that are very common in Route Survey for laying out the horizontal curves in modern highways. Also discuss the advantageous and disadvantageous for each type of the curve when being applied in highway design. (15 points)

5) Given A and B are two control points whose coordinates are X_A = 25,068.670 m., Y_A = 29,693.183 m. and X_B = 26,984.819 m., Y_B = 24,424.243 m. respectively. The surveyor has chosen station B as the entrance of the proposed new tunnel that shall be built through the mountain range DE as shown in the sketch below. The station C is planned to be the location of the exit point of the tunnel. The stations B and C are invisible from each other because of the mountain range DE. A Total Station had been set up at the station A and the following field data were recorded as follows. Determine the azimuth of the tunnel axis BC. (25 points)

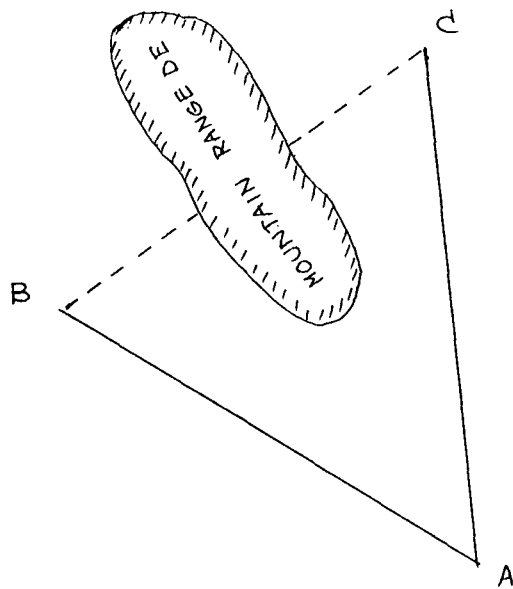| Station	To	Face	Hor. Cir. Rdg	Ver. Cir. Rdg	Slope Dist. (m.)	Remark
A	B	L	225° 12' 15"			
	C	L	257 40 30	88° 45' 50"	9,849.406	
	C	R	77 40 36	271° 14' 20"	9,849.408	
	B	R	45 12 11			

Table 10.3 Factors for Determining Strength of Figure (*Courtesy U.S. National Ocean Survey*)
Values of $(\delta_A^2 + \delta_A\delta_B + \delta_B^2)$ for various combinations of distance angles A and B of a triangle

	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°
10°	428	359																					
12	359	295	253																				
14	315	253	214	187																			
16	284	225	187	162	143																		
18	262	204	168	143	126	113																	
20°	245	189	153	130	113	100	91																
22	232	177	142	119	103	91	81	74															
24	221	167	134	111	95	83	74	67	61														
26	213	160	126	104	89	77	68	61	56	51													
28	206	153	120	99	83	72	63	57	51	47	43												
30°	199	148	115	94	79	68	59	53	48	43	40	33											
35	188	137	106	85	71	60	52	46	41	37	33	27	23										
40	179	129	99	79	65	54	47	41	36	32	29	23	19	16									
45	172	124	93	74	60	50	43	37	32	28	25	20	16	13	11								
50°	167	119	89	70	57	47	39	34	29	26	23	18	14	11	9	8							
55	162	115	86	67	54	44	37	32	27	24	21	16	12	10	8	7	5						
60	159	112	83	64	51	42	35	30	25	22	19	14	11	9	7	5	4	4					
65	155	109	80	62	49	40	33	28	24	21	18	13	10	7	6	5	4	3	2				
70°	152	106	78	60	48	38	32	27	23	19	17	12	9	7	5	4	3	2	2	1			
75	150	104	76	58	46	37	30	25	21	18	16	11	8	6	4	3	2	2	1	1	1		
80	147	102	74	57	45	36	29	24	20	17	15	10	7	5	4	3	2	1	1	1	0	0	
85	145	100	73	55	43	34	28	23	19	16	14	10	7	5	3	2	2	1	1	0	0	0	0
90°	143	98	71	54	42	33	27	22	19	16	13	9	6	4	3	2	1	1	1	1	0	0	0
95°	140	96	70	53	41	32	26	22	18	15	13	9	6	4	3	2	1	1	0	0	0	0	
100	138	95	68	51	40	31	25	21	17	14	12	8	6	4	3	2	1	1	0	0	0		
105	136	93	67	50	39	30	25	20	17	14	12	8	5	4	2	2	1	1	0	0			
110	134	91	65	49	38	30	24	19	16	13	11	7	5	3	2	2	1	1	1				
115°	132	89	64	48	37	29	23	19	15	13	11	7	5	3	2	2	1	1					
120	129	88	62	46	36	28	22	18	15	12	10	7	5	3	2	2	1						
125	127	86	61	45	35	27	22	18	14	12	10	7	5	4	3	2							
130	125	84	59	44	34	26	21	17	14	12	10	7	5	4	3								
135°	122	82	58	43	33	26	21	17	14	12	10	7	5	4									
140	119	80	56	42	32	25	20	17	14	12	10	8	6										
145	116	77	55	41	32	25	21	17	15	13	11	9											
150	112	75	54	40	32	26	21	18	16	15	13												
152°	111	75	53	40	32	26	22	19	17	16													
154	110	74	53	41	33	27	23	21	19														
156	108	74	54	42	34	28	25	22															
158	107	74	54	43	35	30	27																
160	107	74	56	45	38	33																	
162°	107	76	59	48	42																		
164	109	79	63	54																			
166	113	86	71																				
168	122	98																					
170	143																						