

Faculty of Engineering
Prince of Songkla University
Final Examination 1st Semester 2003

Subject: 220-361 Survey II

Room: A201

Date: October 5th, 2003

Time : 9:00-12:00 (3 Hrs.)

Instructions

- 1) There are 5 problems in the examination. (100 points)
 - 2) Attempt all problems.
 - 3) Books and Notes are not allowed.
 - 4) Student may use an electronic calculator.
 - 5) Student may bring in a dictionary.
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นาย รุจ ศุภวิไล
ผู้ออกข้อสอบ

- 1) From the spherical triangle PZS of an Astronomical Triangle, P is the North Celestial Pole, Z is the observer Zenith and S is the celestial body (the star).

Using the principles of spherical trigonometry, show that.

$$\cos Z = (\sin \delta / \cos \phi) - \tan h \tan \phi .$$

Where

δ = declination of the star.

h = altitude of the star.

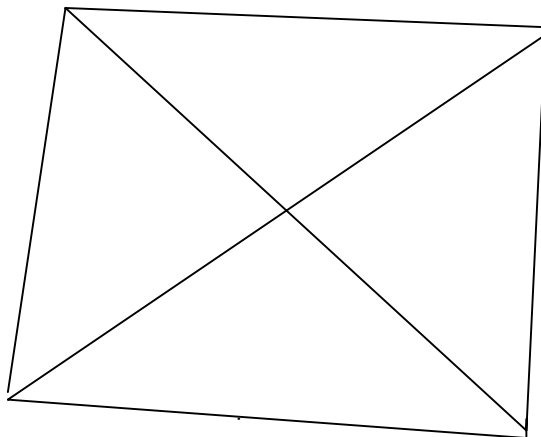
ϕ = latitude of the place.

And Z = azimuth of the star.

(15 points)

- 2) An entering grade of -2.75% meets a departing grade of $+1.25\%$ at station $18+050$ km. the two grades intersect at the elevation of 123.190 m. above mean sea level. If these two grades are connected by a 300 -m equal tangent parabolic curve, compute the elevation of points BVC, EVC and all full stations for every 20 m. Also determine the elevation and the location of the point where the drainage pipe should be placed. (20 points)

- 3) It is desired to compute the strength of the quadrilateral ABCD, as shown in the sketch, for computation of side CD from known side AB when all lines are observed in both directions. Determine the best route for the computation. (20 points)



- 4) Given the stations of P.I. is $96 + 03.90$ ft. The deflection angle θ is $104^\circ 36'$. The degree of curve D_a is to be $12^\circ 00'$ according to the arc definition (Arc Basis). Stake out the curve at full station by tabulating the deflection angles and chord distances. Using feet as the unit of measurement. (20 points)
- 5) On October 11th, the observed altitude of the sun at the given station A is $31^\circ 20' 35''$ at $14^h 41^m 35^s$ local time. The latitude of the place is $37^\circ 52' 20''$ N and the longitude is 120° W. The temperature is 75°F (24°C) and the barometric pressure is $29.3''$ Hg. The mean horizontal angle (measured clockwise) from the reference station B to the sun is $60^\circ 01' 57''$. Determine the azimuth of the sun as well as the azimuth of the reference line AB. (25 points)
- Hint: $\text{GMT} = \text{Local Time} + 8^h$.
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