PHY 241
Lab 2

Catchment Area Surveying

Each group will be responsible for measuring the area of a designated plot located on campus. The area will be marked by 4 cones, delimiting a quadrilateral marked by straight lines between each consecutive cone. The area will not be a simple rectangle. It is highly recommended that you do some research on how to calculate the area of a quadrilateral to be certain you understand all the measurements you will need.

You will use four methods: ballpark estimate, pacing, tape measure, and GPS.

You will be given some time to develop a plan. Be sure your plan outlines how your plan will be implemented, and what data must be recorded in the field. Don't forget the shape maybe irregular, so be sure you know what measurements will be needed. You will be supplied with surveyor's tape, and a GPS unit. You will be outside, so dress appropriately.

Procedure

- Each member of each group should independently do a "ballpark estimate" standing in one place. Record your own data and do not discuss your values until after all members have made their estimates. You may use any methods for the estimation that does not involve appreciable movement. The anonymous answers for the entire class will be made available for discussion.

- Determine the area by pacing. The group may do any measurements of the pace, but must use only the pacing to determine the area. (Any angles must also be determined by pacing.) You may wish to have one or more members perform your pacing method, as time permits.

- Determine the area through direct measurements with a surveyor's tape measure. (Any angles must also be determined using the tape measure.)

- Determine the area using a GPS unit. Use only the longitude and latitude coordinates given by the GPS. The distances are to be determined later via formulation or using the internet engines provided below.

  Northern Arizona University - http://jan.ucc.nau.edu/~cvm/latlongdist.html
  Movable Type - http://www.movable-type.co.uk/scripts/latlong.html

Analysis and Report

1. Fully describe the procedure you used for each method, including any difficulties you encountered. For the ballpark estimate, you need only comment on the numbers posted and your interpretation of the meaning of those values.

2. Compute the area for each method. Using an estimate of the error associated with the lengths (and angles if used), determine the error/uncertainty in the area for each method.

3. Which method was most reliable? Defend your answer.