Homework Assignment (Due Monday April 30, 2007)

1) After selecting a value for the radius R of the reference sphere, use equation (5) to construct your own polar equal angle net by considering a series of cones centered at O with dip angle $\psi = 90°$, and half-apex angles φ ranging between 0 and 90° with 10° increments. Radial lines centered at O are then constructed with 10° increments.

2) After selecting a value for the radius R of the reference sphere, construct an equatorial equal angle net showing great and small circles with 10° increments.

3) The following data were obtained from three non-parallel boreholes, each of which intersected the same fracture plane

BH #	Trend β	Plunge ψ	Angle φ*
1	049	71	59
2	127	20	43
3	223	40	67

* see Fig. 14 in Lecture Notes 11

Determine the orientation of the fracture plane. This problem should be solved analytically using the equations derived in lecture notes 11.

4) Write a computer program that can be used for the statistical analysis of joint orientation data using the floating circle counting method. The objective is to determine major joint sets in a rock mass.

As a numerical example, you are provided with a file PLANIN.DAT containing 776 measurements of dip angles (between 0 and 90°) and dip direction angles (between 0 and 360°). The measurements were made by undergraduate students on a granite outcrop located in the Boulder Canyon.

a) Can you identify major joint sets or is the rock mass randomly jointed?

b) What is the orientation of the major joint sets?

c) Assume that the road cut has an EW orientation and both sides of the excavation dip at an angle of 60°. Conduct a slope stability analysis for the northern and southern walls of the excavation.