LAB 02: ORTHOGRAPHIC PROJECTIONS OF LINES AND PLANES

The purpose of this lab is to develop your ability to visualize and describe lines and planes in three dimensions, by conceptual, algebraic, and graphical means. See the Matlab help page for the syntax for sph2cart.

In the exercises below, consider north to be towards the top of the page for the top views. Label the points, show the projection lines, and label the right angles. Measure distances to the nearest 0.1 mm and angles to the nearest degree. The scoring is 1 pt for each correctly projected point, with half-credit for a point projected in the correct direction but with an incorrect projection distance, and 1 pt per each correct numerical answer.

1 Exercise 1: Complete the adjacent views (R,F,T) of the lines (3x2 pts)
2 Exercise 2: Complete the adjacent views (A,A,B) of the lines (2 pts, 4 pts)
3 Exercise 3: Complete the four views of the triangle (12 pts)
4 Exercise 4: Find the trend, plunge, and length of the lines (2x5 pts)
5 Exercise 5: Find the strike and dip of the planes. For each plane, label a line of strike in the top view and in a cross section view (7 pts, 7 pts, 9 pts)
6 For a plane with a strike of 30° and a dip of 70°, find the trend and plunge of the pole, and the direction cosines of the pole, using an x=north, y=east, and z=down convention. Solve using long-hand (show your work below or on an attached sheet) and check using a Matlab function you write (modify the template for the function gg303_lab2_template.m on my web page). Include a printout of your Matlab function and a printout showing that it solves the problem. Scoring is 1 pt/box. (8 pts) (65 pts total)

Longhand (5 pts)

<table>
<thead>
<tr>
<th>Plane strike</th>
<th>Plane dip (°)</th>
<th>Pole trend θ (°)</th>
<th>Pole plunge φ (°)</th>
<th>α</th>
<th>β</th>
<th>γ</th>
</tr>
</thead>
<tbody>
<tr>
<td>30°</td>
<td>70°</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Matlab (3 pts)

<table>
<thead>
<tr>
<th>Plane strike</th>
<th>Plane dip</th>
<th>Pole trend</th>
<th>Pole plunge</th>
<th>α</th>
<th>β</th>
<th>γ</th>
</tr>
</thead>
<tbody>
<tr>
<td>30°</td>
<td>70°</td>
<td>As above</td>
<td>As above</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Exercise 3
Exercise 4A

Trend
Plunge
Length

Note that
\[ \text{trend} = \tan^{-1}\left(\frac{\Delta E}{\Delta N}\right) \]
\[ \text{plunge} = \tan^{-1}\left(\frac{\Delta V}{\Delta H}\right) \]

Exercise 4B

Trend
Plunge
Length
Exercise 5A

Strike:
Dip:
Exercise 5B

Strike:

Dip:
Exercise 5C