Homework #6
Due: 11/10/16

1. (40) An FCC single crystal, e.g., Cu, has the slip system {111} <110>, including four possible {111} slip planes and eight possible <110> slip directions. A tensile stress is applied in the [210] direction.

   (a) Write an algorithm to find the Schmid factor for each possible slip system. (Hint: Set up matrices for all possible slip directions and planes.)
   (b) Find which system will be activated first, and the minimum stress (τ_{CRSS}) required to active slip.
   (c) Draw and label the planes/directions for the active slip system and applied stress on a unit cell.

2. (20) In lecture, we drew the {100} and {110} pole figures for a <100> wire texture. (a) Sketch the {111} pole figure for this fiber texture. We also drew the {111} and {110} pole figures for a {110}<111> sheet texture. (b) Sketch the {100} pole figure for this sheet texture.

3. (20) The dislocation density of a heavily worked metal is reported to be 10^{10} mm^{-2}. If the dislocations in a 1 cm^3 cube were "unraveled" and laid end to end, what is the total dislocation length in meters? in miles?

4. (20) Bowman B.4.1. Give a numerical estimate with correct units for the energy of a 1 meter long edge dislocation in Mg vs. MgO?