1. On a hike through your local park, a friend of yours stumbles upon a previously unknown fault. Because he brings his field notes with him everywhere, he records the trend and plunge of 4 different sets of slickenlines. Later, when he shows them to you, you notice something is wrong. Here is the information from his field notes:

   Fault surface Strike/Dip: N39°W, 47°E
   Slickenline 1 Plunge/Trend: 47°, N51°E
   Slickenline 2:   68°, due N
   Slickenline 3:   47°, N51°W
   Slickenline 4:   34°, due N

   a) Assuming that your friend recorded the fault's planar attitude correctly, determine which lineation measurement(s) are impossible. (Which lineation(s) cannot possibly lie in the specified plane?) Support your statements with a well-constructed stereonet. (12 points)

   Slickenlines 2 and 3 cannot possibly be on the plane
   (2 points for each correctly plotted feature (10 points total) plus 1 point for each correctly identified incorrect slickenline measurement.)

   b) Assuming the measurement of lineation 1 is correct, what is its rake? (3 points)

   90° (+/- 1°)

   c) Once your friend realizes his mistake, the two of you return to the park and re-measure the lineations. This time, you get the correct lineations from the previous set plus two additional sets. What is the difference in angle between these two lineations? (7 points)

   60° (+/- 2°)
   2 points for each correctly plotted slickenline, plus 3 points for the right rake

2. Using the space below, calculate strike and dip of the limestone bed that crops out at the three X's. (15 points)
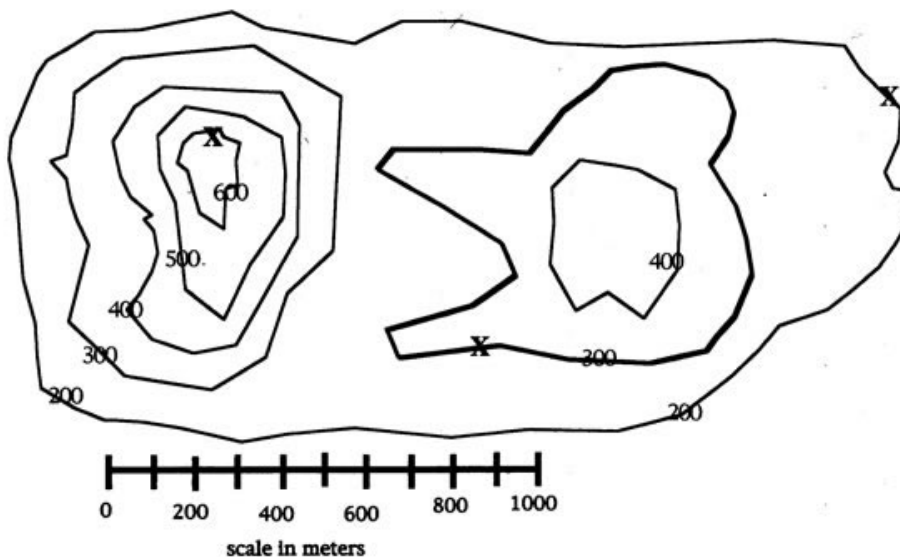
   Strike: N43°E (+/- 3°, but N and E must be correct) Dip: 23° (+/- 3°)
   Give points for valid attempts (see http://www.rniccage.com/geology/3_point_problem/ for proper method)

Questions 3 through 7 refer to the following table showing the UTM data for two locations.

	Location A	Location B
UTM Zone	19	19
Easting	634098	222376
Northing	436270	436689

3. Location A and B are (2 points)
   a) Both west of the central meridian
   b) Both east of the central meridian
   c) Both north of the central meridian
   d) Both south of the central meridian
   e) On opposite sides of the central meridian

4. What state could these locations possibly be in? (2 points)
   a) Arizona
   b) Minnesota
   c) Massachusetts
   d) Louisiana

5. Which location is farther north? By how much? (3 points)

   Location B (1 point), 419 m (2 points)

6. Which location is closer to the central meridian? How far away is it? (4 points)

   Location A (2 points), 134,098 m (2 points)

7. How many degrees of longitude wide is zone 19? **Tie Breaker** (2 points)

   6°