Math 330 - Quiz 1 Study Guide

Choose any four of the following problems to hand in on Tuesday, June 2.

1. Textbook problem 2.15 (p. 8).
3. Define each of the following terms associated to \( \triangle ABC \), where \( A, B, C \) are non-collinear point in Euclidean space.
   - circumscribed circle
   - orthocenter
   - median
   - centroid
   - circumcenter
   - altitude
   - incenter
   - inscribed circle
   - nine-point circle
5. Prove the following statement: Suppose \( S, T \) are convex subsets of the Euclidean plane. Then the intersection \( S \cap T \) is convex.
7. Suppose \( \triangle ABC \) is a triangle, and let \( X, Y, Z \) be the centers of the excircles. Do the vertices of \( \triangle ABC \) lie on the edges of \( \triangle XYZ \)? Prove your answer.
8. Let \( \ell, m, n \) be the three angle bisectors of a triangle. Prove that these are concurrent. That is, prove that the intersection point of \( \ell \) and \( m \) is the same as the intersection point of \( m \) and \( n \), and this is the same as the intersection point of \( \ell \) and \( n \).