Math 340: Geometry

Homework 8

1. Exercises 6.6.1, 6.6.2, and 6.6.3.
2. Exercise 6.7.1.
3. Exercise 6.7.2.
4. Exercises 3.7.1 and 3.7.2.
5. Exercises 3.7.3 and 3.7.4.
6. Exercises 8.1.3 and 8.1.4.
7. In the statement of Pascal's Theorem (problem 6 in Midterm 2) all six points are distinct. However, when two points are the same on a circle, we can still think of them as distinct but "infinitesimally" close. In this way the line they determine is the tangent to the conic at their common position.
   (a) State the analogue of Pascal's Theorem in the case when just two of the points of the hexagon, say A and F, coincide on the circle. Draw a picture.
   (b) State the analogue of Pascal's Theorem when $E = F$ and $C = D$. Draw a picture.
8. Lines AP, BP and CP meet the sides of triangle $\triangle ABC$ at points A_1, B_1 and C_1, respectively. Suppose that lines B_1C_1, C_1A_1, A_1B_1 intersect BC, CA, AB at points A_2, B_2, C_2, respectively. Prove that the points A_2, B_2 and C_2 lie on a line.
9. Two circles intersect at A and C. The tangents at A to these circles intersect at B and D. Prove $\overline{AB} \cdot \overline{CD} = \overline{AC} \cdot \overline{AD}$.