***Theorem* 29** If A and B are equidistant from P and Q then every point between A and B has the same property.

***Theorem* 30** If a line L contains the midpoint of $\overline{PQ}$ and contains another point which is equidistant from P and Q, then $L \perp \overleftrightarrow{PQ}$.

***Theorem* 31** If a line is perpendicular to each of two intersecting lines at their point of intersection, then it is perpendicular to the plane that contains them.

***Theorem* 32** If L is the perpendicular bisector of the segment $\overline{AB}$ then all points of L are equidistant from A and B.

***Theorem* 33** Let A, B and P be points of a plane E. IF P is equidistant from A and B, then P lies on the perpendicular bisector of $\overline{AB}$

***Theorem* 34** The perpendicular bisector of a segment in a plane is the set of all points of the plane that are equidistant from the end points of the segment.

***Theorem* 35** Given a line l and a point P of l. There is only one plane which is perpendicular to l at P.

***Theorem* 36** Every point of the perpendicular bisecting plane of a segment is equidistant from the end points of the segment.

***Theorem* 37** Every point equidistant from the end points of a segment lies in the perpendicular bisecting plane of the segment.

***Theorem* 38** The perpendicular bisecting plane of a segment is the set of all points that are equidistant from the end points of the segment.

***Theorem* 39** Any two lines perpendicular to the same plane are coplanar.

***Theorem* 40** Through a given point in a given plane there is at least one line perpendicular to the given plane.

***Theorem* 41** Through a given point in a given plane there is at most one line perpendicular to the given plane.

***Theorem* 42** Through a given point not in a given plane there is at least one line perpendicular to the given plane.

***Theorem* 43** Through a given point not in a given plane there is at most one line perpendicular to the given plane.

***Theorem* 44** Given a point and a plane, there is exactly one line which passes through the given point and is perpendicular to the given plane.

***Theorem* 45** If a plane E and line l are perpendicular at a point P, then E contains every line that passes through P and is perpendicular to l.

Homework 8

1. Prove the converse of theorem 32.
2. Prove theorem 35. Don't forget to do both parts, that there is one and that there is only one.
3. Prove theorems 40, 41, 42, 43, 44, 45.
4. Show that if a line l contains two points equidistant from P and Q, then every point of l is equidistant from P and Q.
5. Show that if a plane E contains three non-collinear points which are equidistant from P and Q, then all points of E are equidistant from P and Q.