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HW 4

4 To Show: If $\angle BAC$ and $\angle B'A'C'$ are right angles and $AB \cong A'B'$ and $BC \cong B'C'$, then $\triangle ABC \cong \triangle A'B'C'$.

Proof. Following the hint, construct D on the ray opposite to $\overrightarrow{AC}$ such that $AD \cong A'C'$. Then by SAS, $\triangle DAB \cong \triangle C'A'B'$. Thus, $BD \cong BC$, so $\triangle DBC$ is isosceles with $\angle D \cong \angle C$. Hence, by SAA, $\triangle ABC \cong \triangle ABD \cong A'B'C'$. $\square$

30 To Show: If $\square ABCD$ is a convex quadrilateral and l is a line intersecting AB between A and B, then exactly one of the following holds:

1. There exists a point O such that $B * O * C$ and O is incident to l.
2. There exists a point O such that $C * O * D$ and O is incident to l.
3. There exists a point O such that $A * O * D$ and O is incident to l.
4. C is incident to l.
5. D is incident to l.

32 Using Figure 4.33, note that $\angle A'B'B''$ is supplementary to $\angle A'B'B$. Moreover, $\angle ABB''$ is supplementary to $\angle B'BC$. Thus, since two angles are congruent iff their supplementary angles are congruent, $\angle A'B'B'' \cong \angle ABB''$ iff $\angle A'B'B \cong \angle B'BC$, one of the pairs of alternate interior angles. We get a similar equivalence between the other pair of corresponding angles and alternate interior angles.