

# MATH4350

## Homework Assignment

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### 4.2-1. Euclid's sixth proposition

Hom 4.2-1 (1) Suppose:  $\triangle ABC$  is a triangle and  $\angle A = \angle B$

(2) Claim:  $\overline{BC} = \overline{AC}$ . LEM holds (i.e. we have  $[2] \vee \neg[2]$ )

(3) Assume  $\neg[2]$ . WLOG,  $BC < AC$ .

(4) Then, we have some  $D$  on  $AC$  where  $AD = BC$ . By construction,  $\angle ABD < \angle ABC$ .

(5) But then by SAS, we have  $\triangle ABC \cong \triangle ABD$  since  $\overline{AB} = \overline{BC}$ ,  $\angle A = \angle B$ ,  $\overline{AB} = \overline{AB}$ .

(6) Due to congruence, we have  $\angle ABD = \angle ACB$ , but this ... is a contradiction since  $\angle ABD < \angle ABC$ .

(7) Since  $\neg[2]$  does not hold, by LEM we have  $\neg(\neg[2]) = [2] \vee [2]$

Q.E.D.

#### 4.2-2. Euclid's fifteenth proposition

