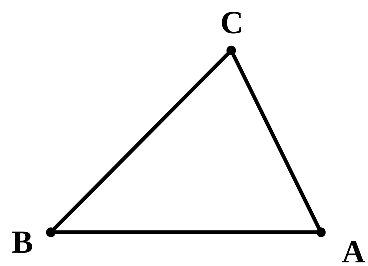
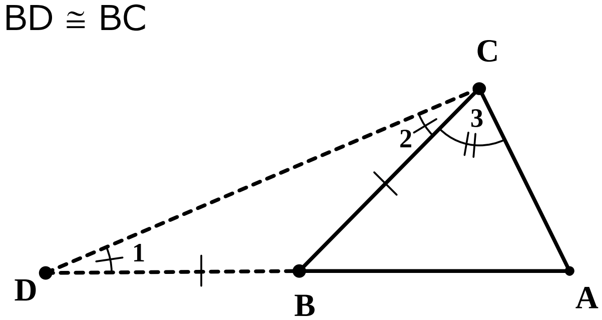
Outline of Proof:
The sum of the lengths of any two sides of a triangle is greater than the length of the third side.

Given: ΔABC
Prove: $AB + BC > AC$



Extend $\overline{AB}$ to point D such that $\overline{BD} \cong \overline{BC}$
Construct ΔDBC.



Since $\overline{BD} \cong \overline{BC} \Rightarrow \angle 1 \cong \angle 2$
(b/c they are angles opposite congruent sides of a triangle)
$m\angle ACD = m\angle 2 + m\angle 3$ and $m\angle 3 > 0^\circ \Rightarrow m\angle ACD > m\angle 2$
$\angle 1 \cong \angle 2 \Rightarrow m\angle ACD > m\angle 1$
If angles of a triangle are unequal then opposite sides of a triangle are unequal in the same order
$\Rightarrow$ in ΔACD, $m\angle ACD > m\angle 1$ so $\overline{AD} > \overline{AC}$
$\overline{AD} = \overline{AB} + \overline{BD} \Rightarrow \overline{AB} + \overline{BD} > \overline{AC} \Rightarrow \overline{AB} + \overline{BC} > \overline{AC}$