

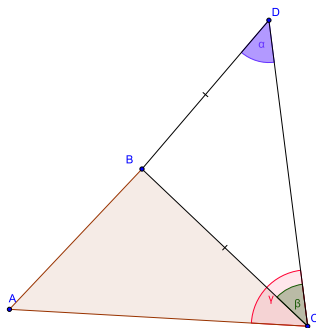
### Proposition I.20

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Prop I.20: In any triangle, the sum of the lengths of any two sides must be greater than the length of the third side.

-Let  $ABC$  be a triangle

-Claim:  $AB + BC > AC$

-Extend  $AB$  to  $D$  such that  $BD = BC$  (I.3)

-Connect  $DC$

- $\triangle BCD$  is isosceles, therefore  $\alpha = \beta$

- $\gamma > \beta$  (c.n.5), so  $\gamma > \alpha$

- $AD > AC$  (I.19)

- $BD = BC$ ,  $AB + BD = AB + BC$  (c.n. 2)

- $AD = AB + BC$

- $AB + BC > AC$

-Similarly, it can be proven that  $AB + AC > BC$ , and  $AC + BC > AB$

QED