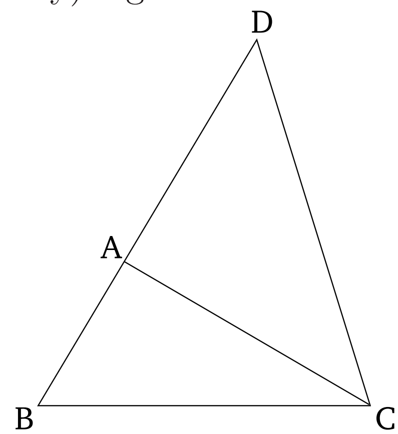
Book 1
Proposition 20

In any triangle, (the sum of) two sides taken together in any (possible way) is greater than the remaining (side).



For let ABC be a triangle. I say that in triangle ABC (the sum of) two sides taken together in any (possible way) is greater than the remaining (side). (So), (the sum of) BA and AC (is greater) than BC, (the sum of) AB and BC than AC, and (the sum of) BC and CA than AB.

For let BA have been drawn through to point D, and let AD be made equal to CA [Prop. 1.3], and let DC have been joined.

Therefore, since DA is equal to AC, the angle ADC is also equal to ACD [Prop. 1.5]. Thus, BCD is greater than ADC. And since DCB is a triangle having the angle BCD greater than BDC, and the greater angle subtends the greater side [Prop. 1.19], DB is thus greater than BC. But DA is equal to AC. Thus, (the sum of) BA and AC is greater than BC. Similarly, we can show that (the sum of) AB and BC is also greater than CA, and (the sum of) BC and CA than AB.

Thus, in any triangle, (the sum of) two sides taken together in any (possible way) is greater than the remaining (side). (Which is) the very thing it was required to show.