Study Note—Euclid's *Elements*, Book I, Proposition 19

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To establish this proposition we must show that, if we are given a triangle with two angles of unequal size, the side that subtends the larger angle is longer than that subtended by the smaller angle.

Thus let ABC be a triangle in which the angle ABC is larger than ACB.



If the sides AB and AC were equal in length then it would follow from Proposition 5 of Book I of Euclid's *Elements of Geometry* that the angles ABC and ACB would be equal. But this is not the case.

If the side AB were longer than the side AC then it would follow from Proposition 18 of Book I of Euclid's *Elements of Geometry* that the angle ACB subtended by AB would be larger than the angle ABC subtended by AC. But this is not the case.

Consequently the side AC of the triangle ABC subtending the larger angle must be longer than the side AB subtending the smaller angle, as required.