EE5609 Matrix Theory

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Download the latex-file codes from

https://github.com/kranthiakssy/AI20RESCH14002_PhD_IITH/tree/master/EE5609_Matrix_Theory/Assignment-5

Assignment-5
GEOLIN

Problem:

Triangle Exercises (1.19):
D is a point on side BC of $\triangle ABC$ such that AD = AC. Show that AB > AD

Solution:

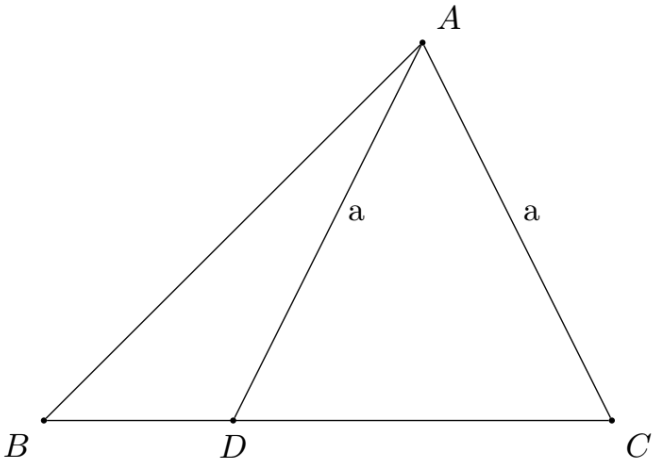

Fig. 0: Triangle generated using LaTeX tikz

The above Fig. 0 shows that, point D placed on side BC of $\triangle ABC$ such that AD = AC.
$\triangle ADC$ forms an isosceles triangle, where angles opposite to the equal sides are same.

$$\angle ADC = \angle ACD \tag{0.0.1}$$

In $\triangle ABD$

$$\angle ABD + \angle ADB + \angle BAD = 180^o \tag{0.0.2}$$
$$\implies \angle ADB = 180^o - \angle ABD - \angle BAD \tag{0.0.3}$$

At point D

$$\angle ADB + \angle ADC = 180^o \tag{0.0.4}$$
$$\implies \angle ADC = 180^o - \angle ADB \tag{0.0.5}$$

By substituting (0.0.3)

$$\angle ADC = 180^o - 180^o + \angle ABD + \angle BAD \tag{0.0.6}$$
$$\implies \angle ADC = \angle ABD + \angle BAD \tag{0.0.7}$$
$$\implies \angle ADC > \angle ABD \tag{0.0.8}$$

from (0.0.1)

$$\angle ACD > \angle ABD \tag{0.0.9}$$

In a triangle, sides opposite to the highest angles are largest.
Hence, from (0.0.9)

$$AB > AC \tag{0.0.10}$$
$$\therefore AB > AD \tag{0.0.11}$$

Hence Proved.