EE5609: Matrix Theory
Assignment-3

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***Abstract*—This document contains a proof for a theorem related to triangle.**

Download the python codes from

https://github.com/pranaya14014/EE5609/tree/master/Assignment2/code

and latex-tikz codes from

https://github.com/pranaya14014/EE5609/tree/master/Assignment2

1 PROBLEM

A line through the mid-point of a side of a triangle parallel to another side bisects the third side.

2 THEOREM

Theorem used for proving,
Basic Proportionality Theorem: If a line is drawn parallel to one side of a triangle intersecting other two sides in distinct points, then the other two sides are divided in same ratio.

3 SOLUTION

Consider a $\triangle ABC$ with sides AB, BC, AC
Let **D** be the mid-point of AB,

$$AD = DB = \frac{AC}{2} \tag{3.0.1}$$

Let **E** be a point on AC and let DE be a line passing through **D** and **E**. From given $DE \parallel BC$
Using Basic proportionality theorem,

$$\frac{AD}{DB} = \frac{AE}{EC} \tag{3.0.2}$$

Using (3.0.1),

$$\frac{AE}{EC} = 1 \tag{3.0.3}$$

$$AE = EC \tag{3.0.4}$$

From (3.0.4) we can say **E** is the midpoint of AC. Hence proved a line through the mid-point of a side of a triangle parallel to another side bisects the third side.

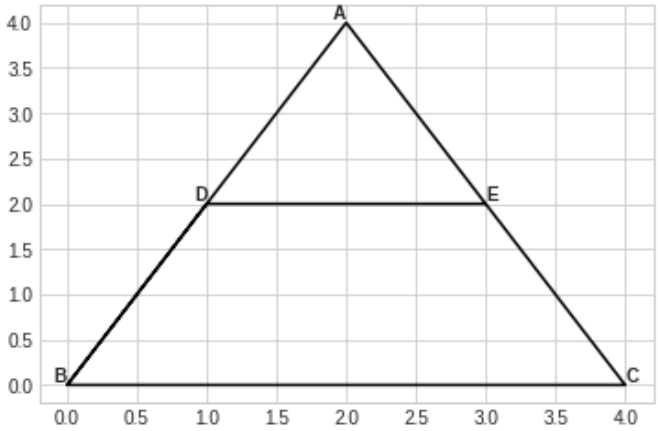

Fig. 0: Triangle plot generated using python