Assignment 3

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***Abstract*—This document solves a problem based on the congruency of a triangles.**

Download latex-tikz codes from

https://github.com/priya6971/matrix_theory_EE5609/tree/master/Assignment3

1 Problem

In right triangle ABC, right angled at **C**, **M** is the mid-point of hypotenuse AB.**C** is joined to **M** and produced to a point **D** such that DM = CM. Point **D** is joined to point **B**. Show that:

$$a)\quad \triangle AMC \cong \triangle BMD \tag{1.0.1}$$

$$b)\quad \angle DBC = 90^\circ \tag{1.0.2}$$

$$c)\quad \triangle DBC \cong \triangle ACB \tag{1.0.3}$$

$$d)\quad CM = \frac{1}{2}AB \tag{1.0.4}$$

2 Solution

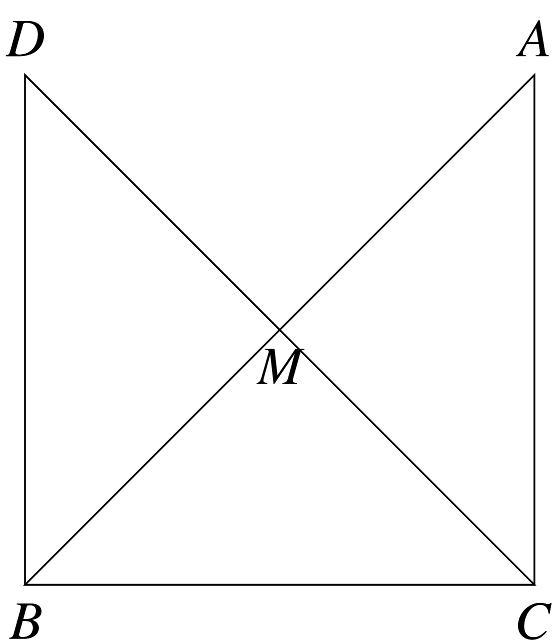

Fig. 1: Triangle ABC and DBC

In $\triangle ABC$, **M** is midpoint of hypotenuse AB, thus

$$\mathbf{M} = \frac{\mathbf{A}+\mathbf{B}}{2} \tag{2.0.1}$$

$$DM = CM \tag{2.0.2}$$

Let $\mathbf{m_{DM}}$ and $\mathbf{m_{CM}}$ are direction vectors of DM and CM respectively. Then,

$$\mathbf{m}_{DM} = \mathbf{D} - \mathbf{M} = \mathbf{D} - \frac{\mathbf{A}+\mathbf{B}}{2} \tag{2.0.3}$$

$$\mathbf{m}_{CM} = \mathbf{C} - \mathbf{M} = \mathbf{C} - \frac{\mathbf{A}+\mathbf{B}}{2} \tag{2.0.4}$$

Now from (2.0.2) we get,

$$\mathbf{m}_{DM} = \mathbf{m}_{CM} \tag{2.0.5}$$

$$\implies \mathbf{D} - \frac{\mathbf{A}+\mathbf{B}}{2} = \mathbf{C} - \frac{\mathbf{A}+\mathbf{B}}{2} \tag{2.0.6}$$