My Presentation

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Question

Exercise 8.1(Q no.28)

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)$\triangle AMC \cong \triangle BMD$

b)$\triangle DBC$ is a right angle.

c)$\triangle DBC \cong \triangle ABC$

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

codes

The python code for the figure is */code/traingle.py*
The latex- tikz code is */figs/triangle.tex*
The above latex code can be compiled as standalone document */figs/triangle_fig.tex*

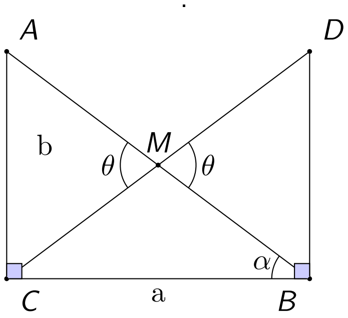

Figure: Right Angled Triangle

Solution a)

From the above figure,

$$C = \begin{pmatrix} 0 \\ 0 \end{pmatrix}, A = \begin{pmatrix} 0 \\ b \end{pmatrix}, B = \begin{pmatrix} a \\ 0 \end{pmatrix}$$

As, M is the midpoint of AB

$$M = \begin{pmatrix} a/2 \\ b/2 \end{pmatrix}$$

Therefore Coordinates of D are

$$D = \begin{pmatrix} a \\ b \end{pmatrix}$$

$\triangle AMC$ and $\triangle DMB$ are congruent to each other by SAS congruency.
(i) Side AM is equal to the corresponding side BM [As M is midpoint of AB]
(ii)Side CM of is equal to corresponding side DM [As M is midpoint of DC]
(iii)$\angle AMC = \angle DMB$ [Vertically Opposite Angles]

Solution b)

In $\triangle ACB$

$$(AB)^2 = a^2 + b^2$$

Since $\angle ACB = 90^\circ$[Pythagorus theorem]
In $\triangle DBC$

Formula

cos $\angle DBC$=

$$((a^2 + b^2 - (DC)^2)/2ab)$$

[DB = D-B = b]

By using distance formula i.e $\sqrt{(x1 - x2)^2 + (y1 - y1)^2}$ we get that AB=DC from the given coordinates.
$cos\angle DBC =$

$$((a^2 + b^2 - (AB)^2)/2ab)$$

$cos\angle DBC$=0
Therefore, $\angle DBC$ is right angle

Solution c)

$\triangle ACB$ and $\triangle DCB$ are congruent to each other in SAS congruency.
(i)Both the triangles have a common base , a.
(ii)AC = DB by using distance formula
(iii)$\angle ACB = \angle DBC = 90^\circ$ [From ◂ Solution b]

Solution d)

Since M is the midpoint of CD
CM=$\frac{1}{2}$ DC From Solution b it is clear that DC=AB
Therefore CM=$\frac{1}{2}$AB
Hence Proved.