Assignment No.1

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Download all python codes from

https://github.com/ka−raja−babu/Matrix−Theory/tree/main/Assignment1/Codes

and latex-tikz codes from

https://github.com/ka−raja−babu/Matrix−Theory/tree/main/Assignment1

1 Question No. 9

In Figure 1, $\angle BAC = 90°$, $AD \perp BC$, Prove that $AB^2 + CD^2 = BD^2 + AC^2$.

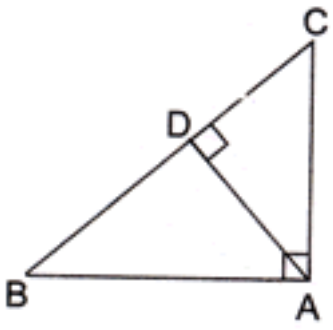

Fig. 1

2 Solution

In fig 1, $\triangle ABC$ where $AD \perp BC$, $\angle BAC = 90°$
To prove : $AB^2 + CD^2 = BD^2 + AC^2$
Proof :- Since $AD \perp BC$
$\angle ADC = \angle ADB = 90°$
In $\triangle ADB$, $\angle ADB = 90°$
So, ADB is a right Triangle

$$\Rightarrow AD^2 = AB^2 - BD^2 \tag{2.0.1}$$

Also in $\triangle ADC$, $\angle ADC = 90°$
$\triangle ADC$ is also right Triangle

$$\Rightarrow AD^2 = AC^2 - CD^2 \tag{2.0.2}$$

From Both 1 and 2 we get
$AB^2 - BD^2 = AC^2 - CD^2$
$\Rightarrow AB^2 + CD^2 = BD^2 + AC^2$ (Hence proved)