Assignment 4

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Download latex-tikz codes from

https://github.com/Bharat437/Matrix_Theory/tree/master/Assignment4

1 Question

(Geometry,1.10) Q. Using cosine formula in an equilateral triangle, show that $\cos 60^\circ = \frac{1}{2}$.

2 Explanation

Let us consider an equilateral $\triangle ABC$, and consider midpoint of line segment AC as F. A line segment is drawn from B to F which bisects Line AC. The figure is shown as below:

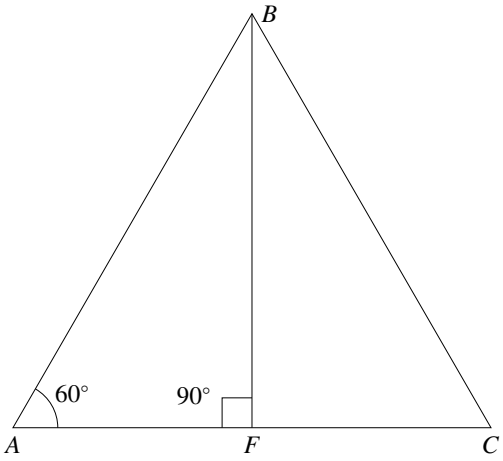

Fig. 1: Equilateral $\triangle ABC$

We know that in equilateral triangle all sides have equal length.

$$\implies \|AB\| = \|BC\| = \|AC\| \tag{2.0.1}$$

Since F is midpoint of line AC.

$$\implies \|AF\| = \frac{1}{2}\|AC\| \tag{2.0.2}$$

From (2.0.1),

$$\implies \|AF\| = \frac{1}{2}\|AB\| \tag{2.0.3}$$

$\triangle ABF$ forms a right-angled triangle. Using cosine formula,

$$\implies \cos 60^\circ = \frac{\|AF\|}{\|AB\|} \tag{2.0.4}$$

$$= \frac{\frac{1}{2}\|AB\|}{\|AB\|} \tag{2.0.5}$$

$$\implies \cos 60^\circ = \frac{1}{2} \tag{2.0.6}$$

Hence proved.