If z and $\bar{z}$ represent adjacent vertices of a regular polygon of n sides with centre at origin and if $\dfrac{\mathrm{Im}z}{\mathrm{Re}z} = \sqrt{2} - 1$, then the value of n is equal to

A 2

B 4

C 6

D 8

Let z_1 be the first vertex of the polygon in the first quadrant,

Hence

$$\arg(z_1) = \frac{2\pi}{8} \times \frac{1}{2} = \frac{\pi}{8}. \, \ldots$$

(angle between two corresponding vertices will be $\frac{2\pi}{n}$, hence angle made by one vertex with the horizontal x-axis will be exactly half of it).

$$\therefore \frac{\text{Im}(z)}{\text{Re}(z)} = \tan(\arg(z))$$

$$= \tan(\frac{\pi}{n})$$

$$= \sqrt{2} - 1$$

Hence, $\frac{\pi}{n} = \tan^{-1}(\sqrt{2} - 1)$

$$\Rightarrow \frac{\pi}{n} = \frac{\pi}{8}$$

Thus $n = 8$.

Hence, the option 'D' is correct.