$$\sin^{-1}\left(\frac{\sqrt{3}-1}{2\sqrt{2}}\right)$$

Step 1: Simplify the expression inside the inverse sine

Let us rationalize and simplify:

$$\frac{\sqrt{3}-1}{2\sqrt{2}} = \frac{(\sqrt{3}-1)}{2\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{(\sqrt{3}-1)\sqrt{2}}{2 \cdot 2} = \frac{(\sqrt{6}-\sqrt{2})}{4}$$

So now the expression becomes:

$$\sin^{-1}\left(\frac{\sqrt{6}-\sqrt{2}}{4}\right)$$

Step 2: Use known identity

$$\sin 15^\circ = \sin\left(45^\circ - 30^\circ\right) = \sin 45^\circ \cos 30^\circ - \cos 45^\circ \sin 30^\circ$$

Using known values:

$$\sin 45^\circ = \cos 45^\circ = \frac{1}{\sqrt{2}}, \quad \cos 30^\circ = \frac{\sqrt{3}}{2}, \quad \sin 30^\circ = \frac{1}{2}$$

$$\sin 15^\circ = \frac{1}{\sqrt{2}} \cdot \frac{\sqrt{3}}{2} - \frac{1}{\sqrt{2}} \cdot \frac{1}{2} = \frac{\sqrt{3}-1}{2\sqrt{2}}$$

Step 3: Final Answer

$$\sin^{-1}\left(\frac{\sqrt{3}-1}{2\sqrt{2}}\right) = 15^\circ = \frac{\pi}{12} \text{ radians}$$

Final Answer:

$$\boxed{\frac{\pi}{12}}$$