12. **If α and β are the roots of $5x^2 - px + 1 = 0$ and $\alpha - \beta = 1$, find p.**

Solution:

$$\alpha + \beta = \frac{p}{5} \qquad \& \quad \alpha\beta = \frac{1}{5}$$

$$\alpha - \beta = 1$$

Adding $$2\alpha = \frac{p}{5} + 1$$

$$\alpha = \frac{p+5}{10}$$

$$\therefore \beta = \frac{p+5}{10} - 1 = \frac{p-5}{10}$$

Hence $$\alpha\beta = \left(\frac{p+5}{10}\right)\left(\frac{p-5}{10}\right) = \frac{1}{5}$$

$$\frac{p^2 - 25}{100} = \frac{1}{5}$$

$$p^2 - 25 = 20$$

$$p^2 = 45$$

$$p = \pm 3\sqrt{5}$$