



Polynomials Ex 2.1 Q5

Answer :

Since α and β are the zeros of the quadratic polynomials $p(x) = 4x^2 - 5x - 1$

$$\text{Sum of the zeros} = \frac{-\text{Coefficient of } x}{\text{Coefficient of } x^2}$$

$$\alpha + \beta = -\left(-\frac{5}{4}\right)$$

$$\alpha + \beta = \frac{5}{4}$$

$$\text{Product of zeros} = \frac{\text{Constant term}}{\text{Coefficient of } x^2}$$

$$\alpha\beta = -\frac{1}{4}$$

We have, $\alpha^2\beta + \alpha\beta^2$

$$\alpha^2\beta + \alpha\beta^2 = \alpha\beta(\alpha + \beta)$$

By substituting $\alpha + \beta = \frac{5}{4}$ and $\alpha\beta = -\frac{1}{4}$ in $\alpha^2\beta + \alpha\beta^2 = \alpha\beta(\alpha + \beta)$, we get

$$\alpha^2\beta + \alpha\beta^2 = -\frac{1}{4}\left(\frac{5}{4}\right)$$

$$\alpha^2\beta + \alpha\beta^2 = -\frac{1}{4} \times \frac{5}{4}$$

$$\alpha^2\beta + \alpha\beta^2 = -\frac{5}{16}$$

Hence, the value of $\alpha^2\beta + \alpha\beta^2$ is $\boxed{-\frac{5}{16}}$.

Polynomials Ex 2.1 Q6

Answer :

Since α and β are the zeros of the quadratic polynomials $f(x) = x^2 + x - 2$

$$\text{Sum of the zeros} = \frac{-\text{Coefficient of } x}{\text{Coefficient of } x^2}$$

$$\alpha + \beta = -\left[\frac{1}{1}\right]$$

$$\alpha + \beta = -\frac{1}{1}$$

$$\alpha + \beta = -1$$

$$\text{Product of zeros} = \frac{\text{Constant term}}{\text{Coefficient of } x^2}$$

$$\alpha\beta = \frac{-2}{1}$$

$$\alpha\beta = -2$$

We have, $\frac{1}{\alpha} - \frac{1}{\beta}$

$$\left(\frac{1}{\alpha} + \frac{1}{\beta}\right)^2 = \left(\frac{1}{\alpha}\right)^2 + \left(\frac{1}{\beta}\right)^2 + \frac{2}{\alpha\beta}$$

$$\left(\frac{\alpha + \beta}{\alpha\beta}\right)^2 = \left(\frac{1}{\alpha}\right)^2 + \left(\frac{1}{\beta}\right)^2 + \frac{2}{\alpha\beta}$$

$$\left(\frac{\alpha+\beta}{\alpha\beta}\right)^2 - \frac{2}{\alpha\beta} = \left(\frac{1}{\alpha}\right)^2 + \left(\frac{1}{\beta}\right)^2$$

By substituting $\alpha + \beta = -1$ and $\alpha\beta = -2$ we get ,

$$\left(\frac{-1}{-2}\right)^2 - \frac{2}{-2} = \left(\frac{1}{\alpha}\right)^2 + \left(\frac{1}{\beta}\right)^2$$

$$\frac{1}{4} + 1 = \left(\frac{1}{\alpha}\right)^2 + \left(\frac{1}{\beta}\right)^2$$

$$\frac{1}{4} + \frac{1 \times 4}{1 \times 4} = \left(\frac{1}{\alpha}\right)^2 + \left(\frac{1}{\beta}\right)^2$$

$$\frac{1+4}{4} = \left(\frac{1}{\alpha}\right)^2 + \left(\frac{1}{\beta}\right)^2$$

$$\frac{5}{4} = \left(\frac{1}{\alpha}\right)^2 + \left(\frac{1}{\beta}\right)^2$$

$$\left(\frac{1}{\alpha} - \frac{1}{\beta}\right)^2 = \left(\frac{1}{\alpha}\right)^2 + \left(\frac{1}{\beta}\right)^2 - \frac{2}{\alpha\beta}$$

By substituting $\frac{5}{4} = \left(\frac{1}{\alpha}\right)^2 + \left(\frac{1}{\beta}\right)^2$ in $\left(\frac{1}{\alpha}\right)^2 + \left(\frac{1}{\beta}\right)^2 - \frac{2}{\alpha\beta}$ we get ,

$$\left(\frac{1}{\alpha} - \frac{1}{\beta}\right)^2 = \frac{5}{4} - \frac{2}{-2}$$

$$\left(\frac{1}{\alpha} - \frac{1}{\beta}\right)^2 = \frac{5}{4} + 1$$

$$\left(\frac{1}{\alpha} - \frac{1}{\beta}\right)^2 = \frac{5}{4} + \frac{1 \times 4}{1 \times 4}$$

$$\left(\frac{1}{\alpha} - \frac{1}{\beta}\right)^2 = \frac{5+4}{4}$$

$$\left(\frac{1}{\alpha} - \frac{1}{\beta}\right)^2 = \frac{9}{4}$$

Taking square root on both sides we get

$$\sqrt{\left(\frac{1}{\alpha} - \frac{1}{\beta}\right)^2} = \sqrt{\frac{3 \times 3}{2 \times 2}}$$

$$\frac{1}{\alpha} - \frac{1}{\beta} = \pm \frac{3}{2}$$

Hence, the value of $\frac{1}{\alpha} - \frac{1}{\beta}$ is $\boxed{\pm \frac{3}{2}}$.

***** END *****

