Exercise 2.1

Question 8:

The zeroes of quadratic polynomial $x^2 + kx + k$ where k ≠ 0,

(A) cannot both be positive

(B) cannot both be negative

(C) are always unequal

(D) are always equal

Answer 8:

(A) cannot both be positive

Solution:

Let $p(x) = x^2 + kx + k$, k ≠ 0

On comparing $p(x) with\ ax^2 + bx + c$, we get

$a = 1, b = k, c = k$

Let α and β be the zeroes of the polynomial $p(x)$.

We know that,

∴ sum of zeroes $\alpha + \beta = -\frac{b}{a}$

$\Rightarrow \alpha + \beta = -\frac{k}{1} = -k$ …(i)

and product of zeroes $\alpha\beta = \frac{c}{a}$

$\Rightarrow \alpha\beta = \frac{k}{1} = k$ …(ii)

Case I

k is negative

If k is negative, $\alpha\beta$ (from equation (ii)) is negative. It means α and β are of opposite sign.

Case II

k is positive

If k is positive, $\alpha\beta$ (from equation (ii)) is positive but $\alpha + \beta$ is negative. If, the product of two numbers is positive, then either both are negative or both are positive. But the sum of these numbers is negative, so numbers must be negative.

Hence, in any case zeroes of the given quadratic polynomial cannot both be positive.