



Quadratic form (Q) Period: 2

A homogeneous polynomial of degree 2 in any number of variables is called quadratic form.

NOTE :-

The matrix corresponding to the quadratic form is

$$A = \begin{pmatrix} \text{coeff of } x_1^2 & \frac{1}{2} \text{ coeff of } x_1 x_2 & \frac{1}{2} \text{ coeff of } x_1 x_3 \\ \frac{1}{2} \text{ coeff of } x_2 x_1 & \text{coeff of } x_2^2 & \frac{1}{2} \text{ coeff of } x_2 x_3 \\ \frac{1}{2} \text{ coeff of } x_3 x_1 & \frac{1}{2} \text{ coeff of } x_3 x_2 & \text{coeff of } x_3^2 \end{pmatrix}$$

Note: The off-diagonal elements are half the coefficient of the corresponding cross terms. Arrows in the original image point to these elements with the word "same".

Write the matrix form of quadratic form

i) $2x_1^2 - 2x_2^2 + 4x_3^2 + 2x_1x_2 - 6x_1x_3 + 6x_2x_3$

ii) $2x^2 + 8z^2 + 4xy + 10xz - 2yz$



Write the quadratic form of matrix.

i) $\begin{pmatrix} 0 & -10 & 2 \\ -1 & 1 & 4 \\ 2 & 4 & 3 \end{pmatrix} = 0$

$x_2^2 + 3x_3^2 - 2x_1x_2 + 4x_1x_3 + 8x_2x_3$

ii) $\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 4 \end{pmatrix}$ $x_1^2 - x_2^2 + 4x_3^2$