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Topic: 1.7 - REDUCTION TO QUADRATIC FORM TO CANONICAL FORM

Reduction of Quadratic form to Canonical form working Rule:

1. Write the matrix of the given Q.F.

2. To find the Cha egy

3. To solve the Cha egy.

H. To find the Eigenvectors orthogonal to each often

5. Form Normalised matrix N

6. Find NT.

Y. FIND AN

8. FIND D=NT AN

9. Canonical form [4,4273] [0] | 42 |

Reduce the quadratic from Q=6x2+3y2+3z2-4xy-2yz+2xx into canonical form by an orthogonal transformation also discuss its nature

Criven Q. F: 6x2+342+322-4xy-242+HZX

Step 1. The mains of the QFi

$$A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$$

Step. 2. To find the cha Equation

The Cha equ. of A 15 23-5,22 822-53=0





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$$= (9-1) + (18-4) + (18-4)$$

$$= 8+14 + 14 = 36$$

83.1
$$\lambda$$
 1 = b (9-17+21- b +3) + 21- b 1

= b (8) + 21- b) + 21- b 1

= a (8) + 21- a (4) + 21- a (7)

= a (8) + 8-8 = 32

The cha equ a (8) a (8) - 12 a (2+3 a (8) - 32 = 0

Step 3: To solve the charter

 a (9) a (12) a (2+3 a (2) - 32 = 0 -0

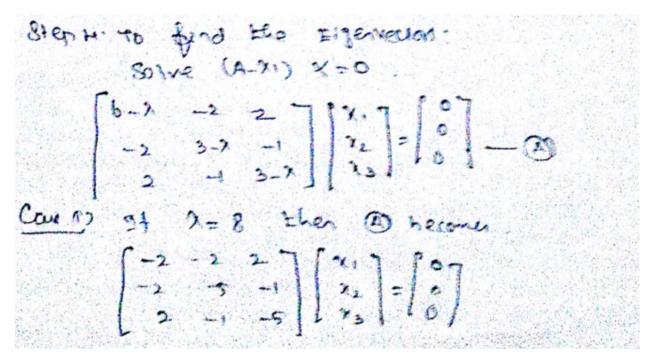
St a (12) a (12) a (2+3 a (2) -32 = 1-12+3 a (3) -32 = 6

St a (9) a (12) a (12) a (13) a (12) a (14) a (15) a (15) a (16) a (16) a (17) a (17) a (18) a (18)





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$$-24, -34 + 34 = 0$$

$$-24, -54, -33 = 0$$

$$24, -42 - 543 = 0$$

$$30 | x_1 - x_2 - 5x_3 = 0$$

$$\frac{x_1}{2+10} = \frac{x_2}{-1-2} = \frac{x_3}{10-14}$$

$$\frac{x_1}{12} = \frac{x_2}{-1} = \frac{x_3}{10-14}$$

$$\frac{x_1}{12} = \frac{x_2}{-1} = \frac{x_3}{10-14} = 0$$





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Care (ii) when
$$x=2$$
, (b) becomes.

$$\begin{bmatrix}
\lambda & -2 & 2 \\
-2 & 1 & 1 \\
2 & -1 & 1
\end{bmatrix}
\begin{bmatrix}
\chi_1 \\
\chi_2 \\
\chi_3
\end{bmatrix} = \begin{bmatrix} 0 \\
0 \\
0 \\
0
\end{bmatrix}$$

$$\lambda x_1 - 2x_2 + 2x_3 = 0$$

$$-2x_1 + x_2 - x_3 = 0$$

$$2x_1 - x_2 + x_3 = 0$$

$$x_2 = x_3 = 0$$

$$x_1 = x_3 = 0$$

$$x_2 = x_3 = 0$$

$$x_2 = x_3 = 0$$

The Hird Eigenvector orthogonal to X, b >2
Since the matrix A is symmetric

Let X3 = [n]

$$x_3$$
 is orthogonal to $x_1 b_{x_2}$
 $\Rightarrow x_1^T v_3 = 0 \Rightarrow 2l_m + n = 0 - 8$
 $b_{x_2}^T x_3 = 0 \Rightarrow 0l_m + n = 0 - 9$





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Solving (8) b (8)
$$\frac{1}{\sqrt{1-1}} = \frac{N}{0-2} = \frac{N}{2-0}$$

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$$\frac{1}{\sqrt{1-1}}$$





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