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BSSE- 2rd Semester

Department of Computer Science
Assignment Spring 2020
Linear Algebra

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Q1 Compute adjoint of

(i) $A = \begin{bmatrix} 1 & 2 & 6 \\ 2 & 3 & 1 \\ 3 & 1 & 2 \end{bmatrix}$

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

(ii) $B = \begin{bmatrix} 3 & 4 & 5 \\ 2 & -1 & 8 \\ 5 & -2 & 8 \end{bmatrix}$

$\text{Adj } B = \begin{bmatrix} 3 & 2 & 5 \\ 4 & -1 & -2 \\ 5 & 8 & 8 \end{bmatrix}$

Q2 Find the cofactors of A_{21}, A_{31}, A_{33} if

$$A = \begin{bmatrix} 1 & -2 & 3 \\ -2 & 3 & 1 \\ 4 & -3 & 2 \end{bmatrix}$$

$$A_{21} = (-1)^{2+1} \begin{vmatrix} -2 & 3 \\ -3 & 2 \end{vmatrix}$$

$$= -1(-4+9)$$
$$= -1(5)$$
$$= -5$$

$$A_{31} = (-1)^{3+1} \begin{vmatrix} -2 & 3 \\ 3 & 1 \end{vmatrix}$$

$$= 1(-2-9)$$
$$= 1(-11)$$
$$= -11$$

$$A_{33} = (-1)^{3+3} \begin{vmatrix} 1 & -2 \\ -2 & 3 \end{vmatrix}$$

$$= 1(3-4)$$
$$= 1(-1)$$
$$= -1$$

Q3 Find Eigen value and Eigen vector

$$A = \begin{bmatrix} 2 & 1 & 1 \\ 1 & 3 & 2 \\ -1 & 1 & 2 \end{bmatrix} \quad \& \quad I = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$|\lambda I - A| = \begin{vmatrix} \lambda-2 & -1 & -1 \\ -1 & \lambda-3 & -2 \\ 1 & -1 & \lambda-2 \end{vmatrix}$$

$$= \lambda-2 \begin{vmatrix} \lambda-3 & -2 \\ -1 & \lambda-2 \end{vmatrix} + 1 \begin{vmatrix} -1 & -2 \\ 1 & \lambda-2 \end{vmatrix} - 1 \begin{vmatrix} -1 & \lambda-3 \\ 1 & -1 \end{vmatrix}$$

$$= (\lambda-2)\left[(\lambda^2-2\lambda-3\lambda+6)-2\right]+1(-\lambda+2+2)-(1-\lambda+3)$$

$$= (\lambda-2)\left[\lambda^2-2\lambda-3\lambda+6-2\right]+(-\lambda+4)-(4-\lambda)$$

$$= (\lambda-2)(\lambda^2-5\lambda+4)+(-\lambda+4)-(4-\lambda)$$

$$= (\lambda^3-5\lambda^2+4\lambda-2\lambda^2+10\lambda-8)-\lambda+4-4-\lambda$$

$$= \lambda^3-5\lambda^2+4\lambda-2\lambda^2+10\lambda-8-\cancel{\lambda}+\cancel{4}-\cancel{4}-\cancel{\lambda}$$

$$= \lambda^3-7\lambda^2+14\lambda-8$$ Ans