

# DTL Assignment

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Q.1) Use Cramer's rule to solve:

$$x + 2z = 6, -x + 4y + 6z = 30, -x - 2y + 3z = 8. \quad [3]$$

Q.2) Prove that the line  $2x - 3y = 9$  touches the conics  $y^2 = -8x$ . Also the point of contact. [1]

Q.3) Determine whether the following are linear transformations or not?

(a)  $T : P \rightarrow P, T(p(x)) = p(x + 1)$  [3]

(b)  $T : P \rightarrow P, T(a + bx + cx^2) = (a + 1) + (b + 1)x + (c + 1)x^2$ . [3]

Q.4) If  $x^2$  and 1 are solutions of  $yy'' - xy' = 0$  then so is any linear combination of these. State true or false and justify. [2]

Q.5) If a matrix  $A = \begin{bmatrix} 0 & a & -3 \\ 2 & 0 & -1 \\ b & 1 & 0 \end{bmatrix}$

is a skew-symmetric, find the values of 'a' and 'b'.

Q.6) True or false with Justification.

(a) If A and B are symmetric then AB is symmetric.

(a) If A and B are invertible then AB is invertible. [3]

Q.7) S is the set of all skew symmetric matrices of order 3. Is S a subspace of  $M(R)$ . [3]

Q.8) Using Elementary row transformations, find the inverse of following matrix:

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

Q.9) Find a linear ordinary differential equation for which the function  $e^{-x} \cos 2x$  and  $e^{-x} \sin 2x$  are linearly independent solutions. [3]