

Show all your work. No credits for answers without work.

Problem 1: Find the general solution of $2xy y' = x^2 + 2y^2$

Problem 2: Show that the equation is exact and solve: $(3x - y) dx + (5y - x) dy = 0$

Problem 3: The augmented matrix of a linear system is given. Determine for values of k the system has (a) unique solution; (b) no solution; infinitely many solutions.

$$\begin{bmatrix} 3 & 0 & 0 & k \\ 0 & 1 & 2 & 1-k \\ 1 & 0 & 3-k & 1 \end{bmatrix}$$

Problem 4: Write the augmented matrix of the system. Use Gauss-Jordan elimination to write the matrix in reduced row Echelon form, then find the solution of the system.

$$x + y + 2z = 1$$

$$2x - y + z = -1$$

$$x - 2y - 3z = 0$$