Problem 1. *Find the inverse matrix of*
$$A = \begin{pmatrix} 1 & 1 & 0 \\ 0 & 2 & -1 \\ 0 & 0 & 3 \end{pmatrix}.$$

Problem 2. *Let A be an invertible matrix. Prove that $A^{-1} = (\det A)^{-1} C^T$, where C is the cofactor matrix.*

Problem 3. *Solve* $x + 2y = 0$, $2x + y + z = 1$, $y - z = 0$ *by using the Cramer's rule.*

Problem 4. *Let us define the polynomials*

$$P(x) = \begin{vmatrix} 1 & x & 3 & x^2 \\ 2 & 0 & 3 & -1 \\ x & x & 1 & 0 \\ x^3 & 0 & -x & 2 \end{vmatrix}, \qquad Q(x) = \begin{vmatrix} 1 & x & x^2 \\ 4 & 0 & 1 \\ x & 2 & -1 \end{vmatrix}.$$

(1) *What are their orders and the coefficients of the highest order term.*
(2) *Find* $Q'(0)$.