Problem 1

Find a basis for kernel of the differential operator $D : C^\infty \to C^\infty$,

$$D^2 - 2D - 3.$$

Problem 2

Find a basis for kernel of the differential operator $D : C^\infty \to C^\infty$,

$$D^4 - 2D^3 - 3D^2.$$

Problem 3

Find a basis for kernel of the differential operator $D : C^\infty \to C^\infty$,

$$D^4 + 8D^2 + 16.$$

Problem 4

Let $T : \mathbb{R}^2 \to \mathbb{R}^2$ be defined by

$$T \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} x + 2y \\ x - y \end{bmatrix}$$

Let α be the standard basis for $\mathbb{R}^2$. Find the matrix of T with respect to α, $[T]_\alpha^\alpha$.

Problem 5

Let α be the standard basis for P^2, and $D : P^2 \to P^2$ be the differential operator. Find $[D]_\alpha^\alpha$.