Name:

# MATH 4377/6308 - Advanced linear algebra I - Summer 2024

## Quiz 4

(1) Let $T : \mathbb{R}^2 \to \mathbb{R}^3$ be given by

$$T(a_1, a_2) = (a_1 + a_2, a_1 - a_2, 2a_2 - a_1).$$

Write $[T]_\beta^{\tilde{\gamma}}$ with $\beta = \{(1,0),(0,1)\}$ and $\tilde{\gamma} = \{(1,2,0),(1,1,0),(1,0,1)\}$.

(2) Let $T : P_1(\mathbb{R}) \to P_1(\mathbb{R})$ and $U : P_1(\mathbb{R}) \to \mathbb{R}^2$ be the linear transformations defined by

$$T(p(x)) = p'(x) + 2p(x), \quad U(a + bx) = (a + b, a)$$

Let $\beta$ and $\gamma$ be the standard ordered bases of $P_1(\mathbb{R})$ and $\mathbb{R}^2$), respectively. Find $[T]_\beta$, $[U]_\beta^\gamma$ and $[U \circ T]_\beta^\gamma$.