Name:

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

Quiz 3

(1)[5Pts] The vectors $u_1 = (0, 0, 1)$, $u_2 = (1, 1, 1)$, $u_3 = (0, 1, 1)$, form a basis for $\mathbb{R}^3$. Find a unique representation of an arbitrary vector $(a, b, c) \in \mathbb{R}^3$ as a linear combination of u_1, u_2, u_3.

(2)[5Pts] Let $T : \mathbb{R}^3 \to \mathbb{R}^3$ be given by

$$T(a_1, a_2, a_3) = (a_1 + 2a_2 - a_3, 2a_1 - a_3, 4a_2 + a_3)$$

(a) Find bases for the null space and the range of T.
(b) Find nullity and rank of T.