**MASTERY QUIZ DAY 21** <span style="float:right">Math 237 – Linear Algebra</span>

**Version 1** <span style="float:right">Fall 2017</span>

Show all work and justify all of your answers. Answers without work or sufficient reasoning will not receive credit. You may use a calculator, but you must show all relevant work to receive credit for a standard.

**A3.** Determine if each of the following linear transformations is injective (one-to-one) and/or surjective (onto).

(a) $S : \mathbb{R}^2 \to \mathbb{R}^2$ given by the matrix $\begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$.

(b) $T : \mathbb{R}^4 \to \mathbb{R}^3$ given by the matrix $\begin{bmatrix} 2 & 3 & -1 & -2 \\ 0 & 1 & 3 & 1 \\ 2 & 1 & -7 & -4 \end{bmatrix}$

**A4.** Let $T : \mathcal{P}^3 \to \mathcal{P}^3$ be the linear transformation given by

$$T\left(ax^3 + bx^2 + cx + d\right) = (a + 3b + 3c + 7d)x^3 + (a + 3b - c - d)x^2 + (2a + 6b + 3c + 8d)x + (a + 3b - 2c - 3d)$$

Compute the kernel and image of $T$.

**A3:** [    ] <span style="float:right">**A4:** [    ]</span>