

**Linear Algebra Quiz 6**

Determine the kernel of the given linear transformation. In each case, describe the kernel in parametric vector form.

(a)  $T : \mathbb{R}^4 \rightarrow \mathbb{R}^2$  via  $T(\mathbf{x}) = A\mathbf{x}$  where  $A = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 1 & 2 & 2 & 3 \end{bmatrix}$

(b)  $T : \mathbb{P}_3 \rightarrow \mathbb{P}_3$  via  $T : \mathbf{p}(t) \mapsto \mathbf{p}(t) - t\mathbf{p}'(t)$

(c)  $T : M_{3 \times 3} \rightarrow M_{3 \times 3}$  via  $T : A \mapsto (A + A^\top)$

(d)  $T : \mathbb{R}^2 \rightarrow M_{2 \times 3}$  via  $T(x, y) = \begin{bmatrix} 0 & x - 2y & 2y - x \\ 2x - 4y & 4y - 2x & 0 \end{bmatrix}$