

**Problem 1.** Given unknowns $r$ and $s$, is it possible to find $a$ and $b$ so that

$$
2 \begin{bmatrix} r \\ 0 \\ -2r \\ s \end{bmatrix} - 3 \begin{bmatrix} t \\ 0 \\ -2t \\ w \end{bmatrix} = \begin{bmatrix} a \\ 0 \\ -2a \\ b \end{bmatrix}?
$$

If so, what are the formulas for $a$ and $b$?

**Problem 2.** The subset

$$
S = \left\{ \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix} \bigg| x_2 = 0, \ x_3 = -2x_1 \right\}
$$

is equal to the null space of some matrix $A$. Find $A$.

**Problem 3.** Problem 8, section 3.2, page 132. (Notice that “a vector $A$ in $\mathbb{R}^{2\times2}$ means a 2-by-2 matrix $A$.) Model your arguments on the text on page 127 on nullspaces.

**Problem 4.** Problem 11, section 3.2, page 133.

**Problem 5.** Problem 13, section 3.2, page 133.

**Problem 6.** If $v$ etc. are all vectors from the same vector space, find a solution to $r$, $s$ and $t$ (Don’t worry about necessarily finding all solutions) given that you know

$$(2v - w) - 2(2v - q) + 2(v + w + q) = (r + s)v + sw + \left(s + \frac{t}{2}\right)q$$