

Homework #8

Please print your name:

Problem 1. For each of the following sets, decide whether they are a vector space. Briefly indicate your reasoning!

$$(a) V = \left\{ \begin{bmatrix} a \\ 2 \\ 2a - b \end{bmatrix} : a, b \in \mathbb{R} \right\}$$

$$(b) V = \left\{ \begin{bmatrix} a \\ 2b \\ 2a - b \end{bmatrix} : a, b \in \mathbb{R} \right\}$$

$$(c) V = \left\{ \begin{bmatrix} x \\ y \\ z \end{bmatrix} : 2x - y = z \right\}$$

$$(d) V = \left\{ \begin{bmatrix} x \\ y \\ z \end{bmatrix} : 2x - y = 1 \right\}$$

$$(e) V = \left\{ \begin{bmatrix} x \\ y \\ z \end{bmatrix} : x^2 + y^2 + z^2 = 1 \right\}$$

$$(f) V = \left\{ \begin{bmatrix} x \\ y \\ z \end{bmatrix} : x + y + z \geq 0 \right\}$$

Problem 2. Write $V = \left\{ \begin{bmatrix} x \\ y \\ z \\ w \end{bmatrix} : 2x - y = w \right\}$ as a null space and determine a basis.