$$\frac{10 \text{ b}}{\text{Def}}$$

$$\frac{\text{Def}}{\text{addition}}$$

$$\frac{10 \text{ b}}{\text{targef}}$$

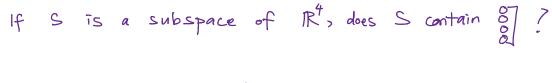
Which transformations are linear transformations?  $\Box f\left( \begin{bmatrix} x \\ y \end{bmatrix} \right) = \begin{bmatrix} x^{2} + y \\ 2 - y \end{bmatrix}$   $\Box f\left( \begin{bmatrix} x \\ y \end{bmatrix} \right) = \begin{bmatrix} 5x + y \\ 2 - y \\ 4 - x \end{bmatrix}$   $\Box f\left( \begin{bmatrix} x \\ y \end{bmatrix} \right) = \begin{bmatrix} x + 2 \\ y \end{bmatrix}$ 

(See Exercise 2 Lec 10 a)  
Suppose 
$$f: IR^2 \rightarrow IR^2$$
 is a linear transformation  
and  $f(v_1) = \begin{bmatrix} 3\\ -2 \end{bmatrix}$ ,  $f(v_2) = \begin{bmatrix} -3\\ -3 \end{bmatrix}$   
and  $V_3 = 3V_1 - 2V_2$   
Compute  $f(v_3)$ 

$$\frac{|ob|}{|what are the standard basis vectors in \mathbb{R}^{3}}$$

$$e_{i} = \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}, e_{z} = \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix}, e_{3} = \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix}.$$
Compute the matrix of the linear transformation
$$f \left( \begin{bmatrix} x \\ y \end{bmatrix} \right) = \begin{bmatrix} 5x + y \\ 2y \\ 4x \end{bmatrix}$$

- Ila (Write these definitions on a cheat sheet) Def We say a subset S of IR<sup>n</sup> is <u>closed</u> under <u>scalar</u> <u>multiplication</u> if ...
- Def In this class, we defined a subspace V of IR" to be ...



Def The image of an mxn matrix A is ...

Let 
$$A := \begin{bmatrix} 1 & 2 \\ 4 & 5 \\ 7 & 8 \end{bmatrix}$$
  
•  $IS \begin{bmatrix} 1 \\ 0 \end{bmatrix}$  in  $Im(A)$ ?  
•  $IS \begin{bmatrix} 2 \\ 6 \\ 9 \end{bmatrix}$  in  $Im(A)$ ? Use the fact that  $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$   $Row \begin{bmatrix} 1 & 0 & -1 \\ 0 & 1 & 2 \\ 0 & 0 & 0 \end{bmatrix}$ 

\* 
$$\begin{bmatrix} 3 \\ 6 \\ 1 \end{bmatrix}$$
 in  $\operatorname{im}(A)$ ? Use the fact that  $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$  reduce  $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ 

$$- |s| \left( \begin{array}{c} 0\\ 0\\ \end{array} \right)$$
 in  $im(A)$ ?