

1) Below are 12 expressions. Circle those that are spaces, box those that are bases.

$$\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$$

$$\left\{ \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} \right\}$$

$$\text{span} \left(\left\{ \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} \right\} \right)$$

$$\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}, \begin{bmatrix} 2 \\ 4 \\ 6 \end{bmatrix}$$

$$\left\{ \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}, \begin{bmatrix} 2 \\ 4 \\ 6 \end{bmatrix} \right\}$$

$$\text{span} \left(\left\{ \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}, \begin{bmatrix} 2 \\ 4 \\ 6 \end{bmatrix} \right\} \right)$$

$$\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ 2 \end{bmatrix}$$

$$\left\{ \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ 2 \end{bmatrix} \right\}$$

$$\text{span} \left(\left\{ \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ 2 \end{bmatrix} \right\} \right)$$

$$\left\{ \begin{bmatrix} a \\ b \end{bmatrix} : a, b \geq 0 \right\}$$

$$\left\{ \begin{bmatrix} a \\ b \end{bmatrix} : a, b \in \mathbb{R} \right\}$$

$$\text{span} \left\{ \begin{bmatrix} a \\ b \end{bmatrix} : a, b \in \mathbb{R} \right\}$$

2) Given the linear transformation defined below, find $T \left(\begin{bmatrix} 1 \\ 2 \end{bmatrix} \right)$

$$T: \mathbb{R}^2 \rightarrow \mathbb{R}^3$$

$$\begin{bmatrix} x_1 \\ x_2 \end{bmatrix} \mapsto \begin{bmatrix} x_1 \\ 2x_2 \\ 0 \end{bmatrix}$$

$$T \left(\begin{bmatrix} 1 \\ 2 \end{bmatrix} \right) = \begin{bmatrix} 1 \\ 4 \\ 0 \end{bmatrix}$$

3) Find $[T]$, the matrix associated to T from problem (2).

$$[T] = \begin{bmatrix} 1 & 0 \\ 0 & 2 \\ 0 & 0 \end{bmatrix}$$