

MTH 225
Quiz #2

1. Suppose $T : \mathbb{R}^2 \mapsto \mathbb{R}^2$ is a linear transformation satisfying

$$T\left(\begin{bmatrix} 1 \\ 0 \end{bmatrix}\right) = \begin{bmatrix} 1 \\ 1 \end{bmatrix} \text{ and } T\left(\begin{bmatrix} 1 \\ 1 \end{bmatrix}\right) = \begin{bmatrix} 1 \\ 0 \end{bmatrix}.$$

Use this information to compute

$$T\left(\begin{bmatrix} 0 \\ 1 \end{bmatrix}\right).$$

$$\begin{aligned} T\left(\begin{bmatrix} 0 \\ 1 \end{bmatrix}\right) &= T\left(\begin{bmatrix} 1 \\ 1 \end{bmatrix} - \begin{bmatrix} 1 \\ 0 \end{bmatrix}\right) \\ &= T\left(\begin{bmatrix} 1 \\ 1 \end{bmatrix}\right) - T\left(\begin{bmatrix} 1 \\ 0 \end{bmatrix}\right) \\ &= \begin{bmatrix} 1 \\ 0 \end{bmatrix} - \begin{bmatrix} 1 \\ 1 \end{bmatrix} \\ &= \begin{bmatrix} 0 \\ -1 \end{bmatrix} \end{aligned}$$