

Lesson 12

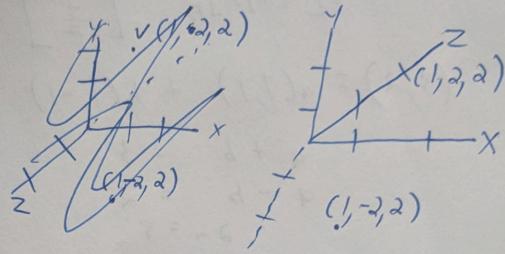
$$\begin{bmatrix} 1 & -2 & 1 \\ 0 & 1 & -2 \\ 1 & 0 & 3 \end{bmatrix}$$

check! $T(e_1) = T(1, 0, 0) = (1, 0, 1)$
 $T(e_2) = T(0, 1, 0) = (-2, 1, 0)$ ✓
 $T(e_3) = T(0, 0, 1) = (0, -2, 3)$

a) $[1, -1, 1] = A$

b) $A(1, -2, 2) = (1, 2, 2)$

3) $A_1 = \begin{bmatrix} 1 & 2 \\ 3 & -1 \end{bmatrix}$ $A_2 = \begin{bmatrix} 0 & 1 \\ 1 & 2 \end{bmatrix}$



$$T = T_2 \circ T_1 = \begin{bmatrix} 1 & 2 \\ -3 & -1 \end{bmatrix} \circ \begin{bmatrix} 0 & 1 \\ 1 & 2 \end{bmatrix} = \begin{bmatrix} 2 & 5 \\ -1 & 1 \end{bmatrix}$$

4) $T_{30^\circ} = \begin{bmatrix} \frac{\sqrt{3}}{2} & -\frac{1}{2} \\ \frac{1}{2} & \frac{\sqrt{3}}{2} \end{bmatrix}$ $T_{60^\circ} = \begin{bmatrix} \frac{1}{2} & -\frac{\sqrt{3}}{2} \\ \frac{\sqrt{3}}{2} & \frac{1}{2} \end{bmatrix}$ $T_90 = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$

$T_{60^\circ} \circ T_{30^\circ}$ $T_{30^\circ} \circ T_{60^\circ}$

$$\begin{bmatrix} \frac{\sqrt{3}}{2} & -\frac{1}{2} \\ \frac{1}{2} & \frac{\sqrt{3}}{2} \end{bmatrix} \cdot \begin{bmatrix} \frac{1}{2} & -\frac{\sqrt{3}}{2} \\ \frac{\sqrt{3}}{2} & \frac{1}{2} \end{bmatrix} = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$$

5) $A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & -1 & 1 \\ 1 & 1 & 0 \end{bmatrix}$ $A^{-1} = \begin{bmatrix} 1 & 0 & 2 & 1 & 0 & 0 \\ 0 & -1 & 1 & 0 & 1 & 0 \\ 1 & 1 & 0 & 0 & 0 & 1 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & 0 & 2 & 1 & 0 & 0 \\ 0 & 1 & -1 & 0 & -1 & 0 \\ 0 & 1 & -2 & -1 & 0 & 1 \end{bmatrix} \rightarrow$

$$\begin{bmatrix} 1 & 0 & 2 & 1 & 0 & 0 \\ 0 & 1 & -1 & 0 & -1 & 0 \\ 0 & 0 & -1 & 1 & 1 & 1 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & 0 & 0 & -1 & 2 & 2 \\ 0 & 1 & 0 & 1 & -2 & -1 \\ 0 & 0 & 1 & 1 & -1 & -1 \end{bmatrix} \quad A^{-1} = \begin{bmatrix} -1 & 2 & 2 \\ 1 & -2 & -1 \\ 1 & -1 & -1 \end{bmatrix}$$

Standard matrix for T^{-1}

$$6) T(v_1) = (3, 0) \quad T(v_2) = (3, 2)$$

$$T(v_2) = (3, 2)$$

$$(3, 0) = \frac{3}{2}(1, 1) + \frac{3}{2}(1, -1)$$

$$\text{so } [T(v_1)]_B = \begin{bmatrix} \frac{3}{2} \\ \frac{3}{2} \end{bmatrix}$$

$$(3, 2) = a(1, 1) + b(1, -1)$$

$$a + b = 3$$

$$a - b = 2$$

$$2a = 5$$

$$a = 2,5$$

$$\text{so } 2,5(1, 1) + 0,5(1, -1) = 3,2$$

$$[T(v_2)]_B = \begin{bmatrix} 2,5 \\ 0,5 \end{bmatrix}$$

$$A = \begin{bmatrix} \frac{3}{2} & 2,5 \\ \frac{3}{2} & 0,5 \end{bmatrix}$$