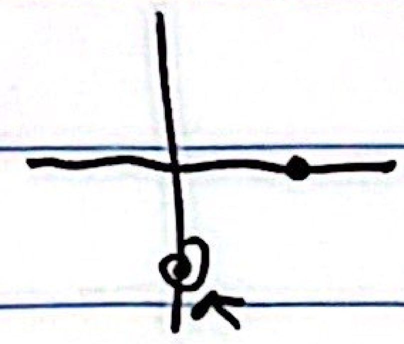
3, 8, 16, 19, 20?, 27, 31, 30?, 33, 3.1: 1.1

[illegible]
10/05/2023

1.9 Homework

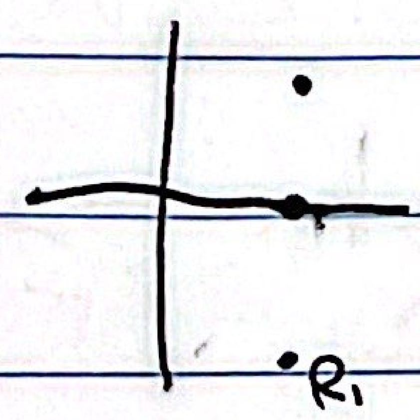
3. $T: \mathbb{R}^2 \to \mathbb{R}^2$ $\quad \begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$ $\quad \begin{matrix} 0+0 \\ -1+0 \end{matrix} = \begin{bmatrix} 0 \\ -1 \end{bmatrix}$

$\begin{matrix} 1 \\ 0 \end{matrix}$



8. $T: \mathbb{R}^2 \to \mathbb{R}^2$

$\begin{bmatrix} 1 \\ 0 \end{bmatrix}$



$R_1 = \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$ $\quad R_2 = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$

$\begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix} \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix} = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$

16. $\begin{bmatrix} 1 & -1 \\ -2 & 1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} =$ $\cancel{x_1 - 2x_3}$ $\cancel{4x_1}$ $\cancel{x_1 - x_2}$ $\begin{bmatrix} x_1 - x_2 \\ -2x_1 + x_2 \\ x_1 \end{bmatrix}$

19. $T(x_1, x_2, x_3) = (x_1 - 5x_2 + 4x_3,\ x_2 - 6x_3)$

$$A = \begin{bmatrix} 1 & -5 & 4 \\ 0 & 1 & -6 \end{bmatrix}$$

27. $\left[\begin{array}{ccc|c} 1 & 0 & 34 & b_1 + 5b_2 \\ 0 & 1 & 6 & b_2 \end{array}\right]$ = infinite solutions

onto

29, 31, ~~32~~, 35, ~~1.9 S.T.~~

29. $\begin{bmatrix} \blacksquare & * & * \\ 0 & \blacksquare & * \\ 0 & 0 & \blacksquare \\ 0 & 0 & 0 \end{bmatrix}$

$T: \mathbb{R}^n \to \mathbb{R}^m$

31. The linear transformation T is one-to-one if and only if A has n pivot columns

32. T ~~is~~ maps $\mathbb{R}^n$ onto $\mathbb{R}^m$ if and only if A has m pivot columns.

m pivot colums = A spans $\mathbb{R}^m$ = onto

35. $T: \mathbb{R}^n$ to $\mathbb{R}^m$ mans its transformaton matrix is $m \times n$ $* m \geq n$

1.9 S.T.

onto: every input has at least one output

one-to-one: every one input has one output