

6. Let W be the subspace of  $\mathbb{R}^4$  whose basis is

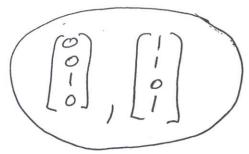
$$w_1 = \begin{bmatrix} 0 \\ 0 \\ 1 \\ 0 \end{bmatrix}, \quad w_2 = \begin{bmatrix} 1 \\ 1 \\ 2 \\ 1 \end{bmatrix}, \quad w_3 = \begin{bmatrix} 1 \\ 1 \\ 0 \\ 1 \end{bmatrix}.$$

Find an orthogonal set which forms a basis for W.

Let 
$$V_1 = \omega_1$$
  
Let  $V_2 = \omega_2 - \frac{V_1 T \omega_1}{V_1^T V_1} V_1 = \begin{bmatrix} \frac{1}{2} \\ \frac{1}{2} \end{bmatrix} - \frac{2}{1} \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix} = \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}$ 

Let 
$$V_3 = \omega_3 - \frac{v_1 T \omega_3}{V_1 T v_1} V_1 - \frac{v_2 T \omega_3}{V_2 T v_2} V_2 = \begin{bmatrix} 1 \\ 0 \end{bmatrix} - 0 - \frac{3}{3} \begin{bmatrix} 1 \\ 0 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$$

so W3 is already in the span of w, w2



7. Is

$$\left\{ \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} \middle| x_1 x_2 = x_3 \right\}$$

a vector space? If so, explain why. If not, give an example to show that one of the rules of vector space fails to hold.

$$(NO)$$
 []  $\in$  this set but  $\begin{pmatrix} 2\\2\\2 \end{pmatrix}$   $\notin$  this sect  $|1|=1$   $2,2\neq 2$