

4) a)  $A = \begin{bmatrix} 1 & 4 \\ 2 & 1 \\ 0 & 2 \end{bmatrix} \sim \begin{bmatrix} 1 & 4 \\ 0 & -7 \\ 0 & 0 \end{bmatrix}$

b) since there is no scalar  $c$  with can make:  
 $c \begin{bmatrix} 1 \\ 8 \end{bmatrix} = \begin{bmatrix} 4 \\ -7 \\ 0 \end{bmatrix}$ , we can say they are  
independent

c)  $H = \begin{bmatrix} a \\ b \\ 0 \end{bmatrix}, a, b \in \mathbb{R}$

for  $H$  to be a subspace of  $\mathbb{R}^3$  it must  
 have 3 properties

1% Zero Vector is in  $H$ .

2% for each  $u$  and  $v$  in  $H$  the sum must be  
 in  $H$

3% for each  $u$  in  $H$  and each scalar  $c$ ,  
 $cu$  must be in  $H$

Since all three is True, we can say  
 $H$  is a subspace of  $\mathbb{R}^3$  and with 2  
Pivot columns it has Rank 2

d)

$$H = \begin{bmatrix} b_1 \\ b_2 \\ b_3 \end{bmatrix}, b_1, b_2 \in \mathbb{R} \text{ and } b_3 \leq 0$$

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