

Consider this family of 3 vectors of the linear space $V = \mathbb{R}^3$: $S = \left\{ \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}, \begin{bmatrix} 1 \\ -4 \\ 5 \end{bmatrix}, \begin{bmatrix} -3 \\ 0 \\ 4 \end{bmatrix} \right\}$.

- Qu.1) Are these vectors linearly dependents or independents? (3 points)
Prove carefully your answer by the method of your choice.
- Qu.2) What is the dimension of the linear space $U = L(S) = \text{span}(S)$ (3 points)
generated by these vectors? ($U \subseteq V = \mathbb{R}^3$).
Again, you have to *justify* your answer with one of the methods seen in lectures/tutorials.
- Qu.3) Find **one** basis for this span U . (1 points)
How many vectors do you need to give for this basis?
- Qu.4) Now find an **orthonormal** basis. (1 points)
What is the simple process you apply?
- Qu.5) (*Harder*) Finally, find an **orthogonal** and orthonormal basis. (2 points)
Again, can you give the name of the process you applied?

(You can start answering from here)

(Your answer stops here)