Basis & Dimension of a Subspace

A *basis* for a subspace H of R^n is a linearly independent set in H that spans H.

If $A = \begin{bmatrix} 1 & -1 & 0 & 0 \\ 0 & 1 & -2 & 2 \\ 0 & 2 & -4 & 4 \end{bmatrix}$ find a basis for *Col* A and also for *Nul* A.

Claim: The pivot columns of a matrix A form a basis for *Col* A.

The *dimension* of a nonzero subspace H, denoted by dim H, is the number of vectors in any basis for H. The dimension of the zero subspace $\{\mathbf{0}\}$ is defined to be zero.

Find dim *Col* A and also dim *Nul* A.

The *rank* of a matrix A, denoted by rank A, is dim *Col* A.

Find rank A.