- The null space of A is the solution set of the equation $A\mathbf{x} = \mathbf{0}$. TRUE
- The null space of an $m \times n$ matrix is in $\mathbb{R}^m$. False. It's $\mathbb{R}^n$
- The column space of A is the range of the mapping $\mathbf{x} \mapsto A\mathbf{x}$. TRUE
- If the equation $A\mathbf{x} = \mathbf{b}$ is consistent, then Col A is $\mathbb{R}^m$. FALSE must be consistent for all b
- The kernel of a linear transformation is a vector space. TRUE To show this we show it is a subspace
- Col A is the set of a vectors that can be written as $A\mathbf{x}$ for some $\mathbf{x}$. TRUE Remember that $A\mathbf{x}$ gives a linear combination of columns of A using $\mathbf{x}$ entries as weights.

- The null space is a vector space. TRUE
- The column space of an $m \times n$ matrix is in $\mathbb{R}^m$ TRUE
- Col A is the set of all solutions of $A\mathbf{x} = \mathbf{b}$. FALSE It is the set of all b that have solutions.
- Nul A is the kernel of the mapping $\mathbf{x} \mapsto A\mathbf{x}$. TRUE
- The range of a linear transformation is a vector space. TRUE It's a subspace(check), thus vector space.
- The set of all solutions of a homogenous linear differential equation is the kernel of a linear transformation. TRUE

- A single vector is itself linearly dependent. FALSE unless it in the zero vector
- If $H = \text{Span}\{\mathbf{b}_1, \ldots, \mathbf{b}_n\}$ then $\{\mathbf{b}_1, \ldots, \mathbf{b}_n\}$ is a basis for H. FALSE They may not be linearly independent.
- The columns of an invertible $n \times n$ matrix form a basis for $\mathbb{R}^n$ TRUE They are linerly independent and span $\mathbb{R}^n$. (why?)
- A basis is a spanning set that is as large as possible. FALSE It is is too large, then it is no longer linearly independent.
- In some cases, the linear dependence relations among the columns of a matrix can be affected by certain elementary row operations on the matrix. FALSE They are not affected.

- A linearly independent set in a subspace H is a basis for H. FALSE It may not span.
- If a finite set S of nonzero vectors spans a vector space V, the some subset is a basis for V. TRUE by Spanning Set Theorem
- A basis is a linearly independent set that is as large as possible. TRUE
- The standard method for producing a spanning set for Nul A, described in this section, sometimes fails to produce a basis. FALSE It NEVER fails!!!
- If B is an echelon form of a matrix A, then the pivot columns of B form a basis for Col A. FALSE Must look at corresponding columns in A.

- The number of pivot columns of a matrix equals the dimension of its column space. TRUE Remember these columns and linearly independent and span the column space.
- A plane in $\mathbb{R}^3$ is a two dimensional subspace of $\mathbb{R}^3$. FALSE unless the plane is through the origin.
- The dimension of the vector space $\mathbb{P}_4$ is 4. FALSE It's 5.
- If $\dim V = n$ and S is a linearly independent set in V, then S is a basis for V. FALSE S must have exactly n elements.
- If a set $\{\mathbf{v}_1 \ldots \mathbf{v}_n\}$ spans a finite dimensional vector space V and if T is a set of more than n vectors in V, then T is linearly dependent. TRUE The number of linearly independent vectors that span a set is unique.

- $\mathbb{R}^2$ is a two dimensional subspace of $\mathbb{R}^3$. FALSE Not a subset, as before.
- The number of variables in the equation $A\mathbf{x} = 0$ equals the dimension of Nul A. FALSE It's the number of free variables.
- A vector space is infinite dimensional is it is spanned by an infinite set. FALSE It must be impossible to span it by a finite set.
- If dim $V = n$ and if S spans V. then S is a basis for V. FALSE S must have exactly n elements or be noted as linearly independent.
- The only three dimensional subspace of $\mathbb{R}^3$ is $\mathbb{R}^3$ itself. TRUE If spanned by three vectors must be all of $\mathbb{R}^3$.