The following is a list of true or false questions from sections 1.1–2.4.

(1) The empty set can be considered a subspace of a vector space $V$.
(2) If $S$ is a subset of a vector space $V$, then $span(S)$ equals the intersection of all subspaces of $V$ that contain $S$.
(3) If $S$ is a linearly dependent set, and $\mathbf{u}_1, \cdots, \mathbf{u}_n$ are vectors in $S$, then there exist scalars $a_1, \cdots, a_n$, not all zero, such that $a_1\mathbf{u}_1 + \cdots a_n\mathbf{u}_n = \mathbf{0}$.
(4) If $S$ is a linearly dependent set, then there exist a finite number of vectors $\mathbf{u}_1, \cdots, \mathbf{u}_n$ in $S$, and scalars $a_1, \cdots, a_n$, not all zero, such that $a_1\mathbf{u}_1 + \cdots a_n\mathbf{u}_n = \mathbf{0}$.
(5) If $S = \{\mathbf{u}_1, \cdots, \mathbf{u}_n\}$ is a linearly dependent set of vectors, then there exist scalars $a_1, \cdots, a_n$, not all zero, such that $a_1\mathbf{u}_1 + \cdots a_n\mathbf{u}_n = \mathbf{0}$.
(6) If $S$ is a linearly independent set, then there exist a finite number of vectors $\mathbf{u}_1, \cdots, \mathbf{u}_n$ in $S$, such that the only scalar $a_1, \cdots, a_n$ satisfying $a_1\mathbf{u}_1 + \cdots a_n\mathbf{u}_n = \mathbf{0}$ are $a_1 = \cdots = a_n = 0$.
(7) Subsets of linearly independent sets are linearly independent.
(8) Subsets of linearly dependent sets are linearly dependent.
(9) If $\{\mathbf{u}_1, \cdots, \mathbf{u}_n\}$ is set of vectors and some vector $\mathbf{v}$ can be expressed as a linear combination of $\mathbf{u}_1, \cdots, \mathbf{u}_n$ in more than one way, then $\{\mathbf{u}_1, \cdots, \mathbf{u}_n\}$ is linearly dependent.
(10) A vector space cannot have more than one basis.
(11) If $V$ is a vector space having dimension $n$, and if $S$ is a subset of $V$ with $n$ vectors, then $S$ is linearly independent iff $S$ spans $V$.
(12) If $T : V \mapsto W$ is a linear transformation, then it carries linearly independent subsets of $V$ into linearly independent subsets of $W$.
(13) If $T : V \mapsto W$ is a transformation from $V$ to $W$, and the only solution to $T(\mathbf{x}) = 0_W$ is $\mathbf{x} = 0_V$, then $T$ is one-to-one.
(14) If $V$ and $W$ are finite dimensional vector spaces, then $\mathcal{L}(V, W) = \mathcal{L}(W, V)$.
(15) If $V$ and $W$ are finite dimensional vector spaces, then $\mathcal{L}(V, W)$ and $\mathcal{L}(W, V)$ are isomorphic.
(16) If $V$ and $W$ are finite dimensional vector spaces, then $\mathcal{L}(V, W)$ and $\mathcal{L}(W, V)$ have the same dimension.
(17) If a square matrix $A$ satisfies $A^2 = I$, then $A = I$ or $A = -I$.
(18) If a square matrix $A$ satisfies $A^2 = 0$, where 0 stands for the zero matrix, then $A = 0$.
(19) If two matrices $A$ and $B$ satisfy $AB = I$, then both $A$ and $B$ are invertible.
(20) If two matrices $A$ and $B$ satisfy $AB = I$, then $Null(L_B) = \{\mathbf{0}\}$ and $L_A$ is onto.