1. Write a formal proof of the following statement: Let $A$ be the augmented form of a certain linear system. Then this linear system is inconsistent iff the last column of the reduced row echelon form of $A$, is a pivot column.

2. Read the definition of linear independence then establish that: A system $\{x_1, x_2, \cdots, x_p\}$ is linearly independent iff one of its members, say $x_1$, is a linear combination of all the others.

3. Do the columns of the following matrix form a linearly independent system? If not find a (nontrivial) linear combination of the columns that yields a zero vector.
   $$\begin{bmatrix}
   1 & 1 & 1 \\
   2 & 1 & -1 \\
   0 & 1 & 3
   \end{bmatrix}$$