## **Ax=b**, A=[ $\mathbf{a}_1,...,\mathbf{a}_n$ ] is k by n matrix, T( $\mathbf{x}$ )=A $\mathbf{x}$

	inconsistent	consistent		consistent for all $\mathbf{h}$ in $\mathbf{D}^k$
		unique solution	many solutions	
row reduction	<i>last</i> column of the augmented matrix [A <b>b</b> ] is a <i>pivot</i> column	<i>all columns</i> of A are pivot columns	at least one <i>non</i> -pivot <i>column</i> in A	A has a pivot position in <i>every row</i>
vectors	<b>b</b> is <i>not</i> in the span of $\mathbf{a}_1, \dots, \mathbf{a}_n$	<b>a</b> <sub>1</sub> ,, <b>a</b> <sub>n</sub> are linearly <i>independent</i>	$\mathbf{a}_{1},,\mathbf{a}_{n}$ are linearly <i>dependent</i>	$\mathbf{a}_{1},,\mathbf{a}_{n}$ span $\mathbf{R}^{k}$
			at least <i>one</i> of the vectors $\mathbf{a}_1,,\mathbf{a}_n$ is a <i>linear combination</i> of the others	each <b>b</b> in $\mathbb{R}^k$ is a linear combination of $\mathbf{a}_1, \dots, \mathbf{a}_n$
matrices	<b>b</b> is <i>not</i> in the span of the columns of A	columns of A are linearly <i>independent</i>	columns of A are linearly <i>dependent</i>	columns of A span $R^k$
		A <b>x=0</b> has <i>only</i> the trivial solution		each <b>b</b> in $\mathbb{R}^k$ is a linear combination of the columns of A
mappings	<b>b</b> is <i>not</i> in the range of <i>T</i>	<i>T</i> is one-to-one	<i>T</i> is <i>not</i> one-to-one	<i>T</i> is <i>onto</i>
		each <b>b</b> in $\mathbb{R}^k$ is the image of at <i>most one</i> <b>x</b> in $\mathbb{R}^n$		Range of $T$ is $\mathbb{R}^k$