Invertible Matrix Theorem for $n \times n$ matrix A

a. A is invertible.
b. A is row equivalent to I.
c. A has n pivot positions.
d. $A\mathbf{x} = \mathbf{0}$ has only trivial solution.
e. Columns of A lin. independent.
f. Linear transf. $\mathbf{x} \to A\mathbf{x}$ 1-to-1.
g. $A\mathbf{x} = \mathbf{b}$ has at least one solution for each $\mathbf{b}$.
h. Columns of A span $\mathbf{R}^n$.
i. Linear transf. $\mathbf{x} \to A\mathbf{x}$ onto.
j. There is C such that CA = I.
k. There is D such that AD = I.
l. A^T is invertible.
m. Columns of A form basis for $\mathbf{R}^n$.
n. Column space of A is $\mathbf{R}^n$.
o. dim Col A = n, *i.e.* dimension of column space of A is n.
p. rank A = n, *i.e.* rank of A is n.
q. Nul A = $\{\mathbf{0}\}$, *i.e.* nullspace of A is $\{\mathbf{0}\}$.
r. dim Nul A = 0, the dimension of the null space of A is 0.
s. A has n nonzero eigenvalues, *i.e.* 0 is not an eigenvalue of A.
t. det A $\neq$ 0.
u. $(\text{Col } A)^{\perp} = \{\mathbf{0}\}$, *i.e.* orthogonal complement of column space of A is $\{\mathbf{0}\}$.
v. $(\text{Nul } A)^{\perp} = \mathbf{R}^n$, *i.e.* orthogonal complement of null space of A is $\mathbf{R}^n$.
w. Row A = $\mathbf{R}^n$, row space of A is $\mathbf{R}^n$.