Proposition 2

Let A, B, C be arbitrary $R^{n \times n}$ matrix

Let R be a row equivalence relation

⇒ ARA hold true for $R \equiv R_k \ldots R_1 \to I_n$

⇒ R is reflexive ①

⇒ If ARB exists then
BRA also exists as inverse of e-ops exists

⇒ R is symmetric ②

If ARB & BRC
then ARC exist by adding the e-ops of both the steps.

⇒ R is transitivity ③

∴ By ① ② & ③

Row equivalence is an equivalence relation