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group inverse

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Let A be an $n \times n$ matrix over \mathbb{R} . A *group inverse* for A is an $n \times n$ matrix X such that

$$AXA = A \tag{1}$$

$$XAX = X \tag{2}$$

$$AX = XA. \tag{3}$$

Such a matrix, when it exists, is unique and is denoted by $A^\#$. A group inverse is a special case of a Drazin inverse.