2.8   Identity matrix as multiplicative unity

Definition 24 *identity matrix/multiplicative unity, $\delta \;\; \hat{=} \; Kronecker\text{-}symbol$*

$$\tilde{I} = \underbrace{\left.\begin{pmatrix} 1 & & & \\ & 1 & & 0 \\ & & \ddots & \\ 0 & & & 1 \end{pmatrix}\right\}N}_{N} \qquad N \times N, \, quadratic \quad \tilde{I} = (\delta_{jk}) \qquad \delta_{jk} = \begin{cases} 0 & if \; j \neq k \\ \\ 1 & if \; j = k \end{cases}$$

$$
\begin{aligned}
\tilde{A}\tilde{I} &= \tilde{A} = \tilde{I}\tilde{A} \\
\tilde{A} \cdot \tilde{0} &= \tilde{0} \cdot \tilde{A} = \tilde{0} \; \text{(trivial)} \\
\left(\tilde{A}\tilde{B}\right)^{\top} &= \tilde{B}^{\top}\tilde{A}^{\top} \\
\left(\tilde{A}\tilde{B}\right)^{+} &= \tilde{B}^{+}\tilde{A}^{+}
\end{aligned}
$$