CHAPTER 2 PROBLEMS

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1. **Problem statement:** Given

$$[S_{ij}] = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 1 & 2 \\ 3 & 0 & 3 \end{bmatrix} \text{ and } [a_i] = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$$

Evaluate: (a) S_{ii}, (b) $S_{ij}S_{ij}$, (c) $S_{ji}S_{ji}$, (d) $S_{jk}S_{kj}$, (e) $a_m a_m$, (f) $S_{mn}a_m a_n$, and (g) $S_{nm}a_m a_n$

Solution:

(a) $S_{ii} = S_{11} + S_{22} + S_{33} = 1 + 1 + 3 = 5$

(b)

$$\begin{aligned} S_{ij}S_{ij} =& S_{1j}S_{1j} + S_{2j}S_{2j} + S_{3j}S_{3j} \\ =& S_{11}S_{11} + S_{12}S_{12} + S_{13}S_{13} + \\ & S_{21}S_{21} + S_{22}S_{22} + S_{23}S_{23} + \\ & S_{31}S_{31} + S_{32}S_{32} + S_{33}S_{33} \\ =& 1 \times 1 + 2 \times 2 + 1 \times 1 + 2 \times 2 + 3 \times 3 + 3 \times 3 \\ =& 28 \end{aligned}$$