Review 8-4

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Problem 1

What is the dimension of the matrix product AB if A is a $p \times q$ matrix and B is a $q \times r$ matrix?

Solution 1

$p \times r$

Problem 2

Count the number of scalar multiplications to multiply A and B where A is a $p \times q$ matrix and B is a $q \times r$ matrix.

Solution 2

pqr

Problem 3

Count the number of scalar multiplications where the dimensions of A_1, A_2, and A_3 are 10×100, 100×5 and 5×50, respectively.

1. $(A_1 A_2) A_3$
2. $A_1 (A_2 A_3)$

Solution 3

1. $5000 + 2500 = 7500$
2. $25000 + 50000 = 75000$

Problem 4

Fully parenthesize the product $A_1A_2A_3A_4$. (There are five distinct ways.)

Solution 4

1. $(A_1A_2)(A_3A_4)$
2. $(A_1(A_2A_3))A_4$
3. $A_1(A_2(A_3A_4))$
4. $A_1((A_2A_3)A_4)$
5. $((A_1A_2)A_3)A_4$