5.12.3

AI25BTECH11008 - Chiruvella Harshith Sharan

Question:

Write the number of all possible matrices of order 2×2 with each entry $1, 2$ or 3.

Solution:

Step 1: Understand the problem

A 2×2 matrix has four entries. Each entry may independently be chosen from the set $\{1, 2, 3\}$. We are asked to count all possible such matrices (order matters — different entries or positions give different matrices).

Step 2: Count choices per entry

Each of the four positions (row 1 col 1, row 1 col 2, row 2 col 1, row 2 col 2) has exactly 3 possible values.

Step 3: Use the product rule

By the rule of product (each position chosen independently),

$$\text{number of matrices} = 3 \times 3 \times 3 \times 3 = 3^4.$$

Step 4: Compute

$$3^2 = 9, \qquad 3^3 = 27, \qquad 3^4 = 81.$$

Final Answer:

$$\boxed{81}$$