

5.12.3

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Question

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

Step 1: Matrix Structure

A 2×2 matrix has four entries:

$$A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}.$$

Each entry a, b, c, d can independently be chosen from the set $\{1, 2, 3\}$.

Step 2: Counting Choices

- Each entry has 3 possible values.
- Since there are 4 entries, total number of matrices is

$$3 \times 3 \times 3 \times 3 = 3^4.$$

Step 3: Final Answer

$$3^4 = 81$$

Total number of such matrices = 81

```
#include <stdio.h>

int main() {
    int a, b, c, d;
    int count = 0;

    for (a = 1; a <= 3; a++) {
        for (b = 1; b <= 3; b++) {
            for (c = 1; c <= 3; c++) {
                for (d = 1; d <= 3; d++) {
                    count++;
                    printf("Matrix %d:\n", count);
                    printf("%d %d\n", a, b);
                    printf("%d %d\n\n", c, d);
                }
            }
        }
    }
}
```

C Code

```

    }
}

printf("Total matrices = %d\n", count);
return 0;

```

Python Code

```
count = 0

for a in [1,2,3]:
    for b in [1,2,3]:
        for c in [1,2,3]:
            for d in [1,2,3]:
                count += 1
                print(f"Matrix {count}: ")
                print(f"{a} {b}")
                print(f"{c} {d}\n")

print("Total matrices =", count)
```