

# CS 124 Programming Assignment 2

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## 1 Caching

When multiplying two matrices  $A * B = C$  using the naive matrix multiplication method, the elements of  $C$  are given as follows

$$C[i][j] = \sum_k A[i][k] * B[k][j]$$

This is naturally implemented with 3 nested for loops iterating over  $i$ ,  $j$ , and  $k$ . There are  $3! = 6$  possible permutations of their order. I tested all of them experimentally to determine which was best. Runtime measurements were taken by running the naive algorithm on  $n \times n$  matrices with randomly generated entries for  $n = 1200$ .

ordering	runtime
i, j, k	5.81s
i, k, j	1.73s
j, i, k	
j, k, i	
k, i, j	
k, j, i	