

Step-1

Given that A is m by n , we have found the number of separate multiplications are involved in each case.

Step-2

(a) A multiplies a vector x with n components.

In the product of Ax every entry involves mn separate multiplications.

Step-3

(b) A multiplies an n by p matrix B and then AB is m by p .

Since A is m by n and B is n by p and AB is of order m by p . So in the product AB every entry involves mnp separate multiplications.

Step-4

(c) A multiplies itself to produce A^2 and here $m = n$.

Since $m = n$, the product A^2 involves n^3 separate products and these are n^2 dot products.