Some Other Operation Counts

1) $n \times 1$ column vectors x, y :

operation count for $x^T y$ =

$= n\,M + (n-1)\,A$

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2) $n \times n$ matrix A ; $n \times 1$ column vector x :

operation count for Ax =

$n\,[n\,M + (n-1)\,A] = n^2\,M + n(n-1)\,A$

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3) $n \times n$ matrices A, B :

operation count for AB =

$n\,[n^2\,M + n(n-1)\,A] = n^3\,M + n^2(n-1)\,A$

Associativity of Matrix Multiplication

A $n \times n$

B $n \times n$

x $n \times 1$

$(AB)x = A(Bx)$ BUT

consider operation counts:

AB	n^3 M +	$n^2(n-1)$ A
$(AB)x$	n^2 M +	$n(n-1)$ A
Total:	(n^3+n^2) M +	$n(n+1)(n-1)$ A

Bx	n^2 M +	$n(n-1)$ A
$A(Bx)$	n^2 M +	$n(n-1)$ A
Total:	$2n^2$ M +	$2n(n-1)$ A

Which would you do, $(AB)x$ or $A(Bx)$?