

- 5) In general for multiplying 2 matrices of size ~~$a \times b$~~ and $b \times c$.

for calculating each element of the new matrix of size $a \times c$ we need following operations

- b multiplications
- $b-1$ additions.

Total = $2b-1$ operations per element

To find the final matrix $a \times c \times (2b-1)$ operations.

(i) To calculate $(AB)C$

for $AB \rightarrow p(2q-1)r$ operations

for $(AB)C \rightarrow p(2q-1)r + p(2r-1)t$ operations.

(ii) To calculate $A(BC)$

for $BC \rightarrow q(2r-1)t$ operations.

for $A(BC) \rightarrow q(2r-1)t + p(2q-1)t$ operations.

for $(AB)C$ to be more efficient.
 $p(2q-1)r + p(2r-1)t < p(2q-1)t + q(2r-1)t$
 divide by $pqrt$.

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PTO

$$\frac{2}{t} - \frac{1}{qt} + \frac{2}{q} - \frac{1}{q\delta} < \frac{2}{\delta} - \frac{1}{q\delta} + \frac{2}{p} - \frac{1}{p\delta}$$

We can ignore the terms with 2 terms in the denominator because they will be very small comparatively.

$$\frac{1}{t} + \frac{1}{q} < \frac{1}{\delta} + \frac{1}{p}$$