MATH 300

Laws of Matrix Arithmetic

For scalars α and β and for any matrices A, B, and C for which the indicated operations are defined and for zero matrix O and identity matrix I:

1. $(A + B) + C = A + (B + C)$
2. $A + B = B + A$
3. $(AB)C = A(BC)$
4. $A(B + C) = AB + AC$
5. $(A + B)C = AC + BC$
6. $(\alpha\beta)A = \alpha(\beta A)$
7. $\alpha(AB) = (\alpha A)B = A(\alpha B)$
8. $(\alpha + \beta)A = \alpha A + Bb$
9. $\alpha(A + B) = \alpha A + \alpha B$
10. $A + O = A = O + A$
11. $A + (-A) = O = -A + A$
12. $IA = A = AI$
13. $A(A^{-1}) = I = (A^{-1})A$, provided that A^{-1} exists.

Note: In general $AB \neq BA$.