THEOREM 1.4.2 Properties of Zero Matrices
If $c$ is a scalar, and if the sizes of the matrices are such that the operations can be performed, then:

(a) $A + 0 = 0 + A = A$
(b) $A - 0 = A$
(c) $A - A = A + (-A) = 0$
(d) $0A = 0$
(e) If $cA = 0$, then $c = 0$ or $A = 0$.

THEOREM 1.4.1 Properties of Matrix Arithmetic
Assuming that the sizes of the matrices are such that the indicated operations can performed, the following rules of matrix arithmetic are valid:

(a) $A + B = B + A$  [Commutative law for matrix addition]
(b) $A + (B + C) = (A + B) + C$  [Associative law for matrix addition]
(c) $A(BC) = (AB)C$  [Associative law for matrix multiplication]
(d) $A(B + C) = AB + AC$  [Left distributive law]
(e) $(B + C)A = BA + CA$  [Right distributive law]

THEOREM 1.4.8 If the sizes of the matrices are such that the stated operations can be performed, then:

(a) $(A^T)^T = A$
(b) $(A + B)^T = A^T + B^T$
(c) $(A - B)^T = A^T - B^T$
(d) $(kA)^T = kA^T$
(e) $(AB)^T = B^TA^T$