Math 2550
HW 2 - Part 2
Matrices

1. Suppose that A, B, and C are 2×2 matrices. Let I be the 2×2 identity matrix. Let O be the 2×2 zero matrix. Let α and β be real numbers.

   (a) Prove that $(B + C)A = BA + CA$

   (b) Prove that $IA = A$

   (c) Prove that $A + 0 = A$

   (d) Prove that $(\alpha + \beta)A = \alpha A + \beta A$.

   (e) Prove that $A(BC) = (AB)C$

   (f) Prove that $(A + B)^T = A^T + B^T$

2. Suppose that A,B,C,D are $n \times n$ matrices (that is, they are square and all of the same size). Use the properties of matrices from class to prove the following.

   (a) $(A + B)(C + D) = AC + AD + BC + BD$

   (b) $(A + B + C)D = AD + BD + CD$

   (c) $(A + B + C)^T = A^T + B^T + C^T$