MATH 2568 HW#3

The algebra of matrices

The *commutator* $[A, B]$ of two $(n \times n)$-matrices A and B is the $(n \times n)$-matrix

$$[A, B] = AB - BA.$$

1. Prove the following algebraic identity for $(n \times n)$-matrices A, B, C:

$$[A, BC] = [A, B]C + B[A, C].$$

2. Prove the following *Jacobi identity* for $(n \times n)$-matrices A, B, C:

$$[A, [B, C]] + [B, [C, A]] + [C, [A, B]] = \mathbf{0}.$$

3. Give an example of (2×2)-matrices A and B such that

$$(A + B)(A + B) \neq A^2 + 2AB + B^2.$$

4. Prove that for each $(n \times n)$-matrix M, $(e^M)^T = e^{(M^T)}$.

5. Do §1.6 #24 from the text

6. Do §1.6 #42 from the text

7. Do §1.6 #50 from the text

Linear (In)dependence

8. Do §1.7 #20

9. Do §1.7 #34

9. Do §1.7 #42

10. Do §1.7 #52