

LADE (550.251) Quiz 2

NAME Solutions

Suppose **A** and **B** are $n \times n$ matrices. Prove/Disprove the following statement:

$$(\mathbf{A} + \mathbf{B})^2 = \mathbf{A}^2 + 2\mathbf{BA} + \mathbf{B}^2.$$

$$\begin{aligned}(\mathbf{A} + \mathbf{B})^2 &= (\mathbf{A} + \mathbf{B})(\mathbf{A} + \mathbf{B}) = \mathbf{A}(\mathbf{A} + \mathbf{B}) + \mathbf{B}(\mathbf{A} + \mathbf{B}) \\ &= \mathbf{A}^2 + \mathbf{AB} + \mathbf{BA} + \mathbf{B}^2 \\ &\neq \mathbf{A}^2 + 2\mathbf{BA} + \mathbf{B}^2 \text{ unless } \mathbf{AB} = \mathbf{BA}\end{aligned}$$