

Your name: \_\_\_\_\_  
(first) (last)

1. In what follows, let  $A$  and  $B$  be  $2 \times 2$  matrices, and let  $I$  denote the  $2 \times 2$  identity matrix. In each of the following statements (a)–(c), find out whether the equation is true or not for any square matrix. If it is true, explain why it is true. If it is false, construct  $A$  and  $B$  in Matlab, calculate the left and right side of the equation, and demonstrate that they are different.

(a)  $(AB)^T = A^T B^T$

(b)  $(A + I)(A - I) = A^2 - I$ .

(c)  $(A + B)(A - B) = A^2 - B^2$ .

2. Define  $A = \begin{bmatrix} 0.5 & 0.3 & 0.2 \\ 0.2 & 0.8 & 0 \\ 0.3 & 0.3 & 0.4 \end{bmatrix}$ , and compute

$$A^5 =$$

$$A^{10} =$$

$$A^{20} =$$

Describe what happens in words.