WTW 124 **CLASS TEST 2**

Show your steps clearly and note that this is a closed book test.

1. Let $\bar{a}, \bar{b} \in \mathbb{R}^3$. Then $\bar{a} \times \bar{b} = \bar{b} \times \bar{a}$. True or False? Support your answer in detail. [2]

2. Let

$$A = \begin{bmatrix} 1 & 4 & 3 \end{bmatrix}.$$

Find, if possible, AA^T and A^TA [3]

3. Let A be a 2×2 matrix. Prove or disprove the following statement: if $A \neq 0$, then $A^2 \neq 0$. [2]

4. Find, if possible, conditions on $a, b \in \mathbb{R}$ such that the following system of linear equations has only one solution, by using Gaussian elimination: [3]

$$\begin{aligned} -x + 3y + 2z &= -8 \\ x + z &= 2 \\ 3x + 3y + az &= b. \end{aligned}$$