Name: ____ Quiz 1 - MAT345

Problem 1 (15 points; 3 points each)**.** Decide if each of the following is true or false and provide a justification or counterexample in each case.

(a) _____ If A and B are $n \times n$ symmetric matrices, then AB is symmetric.

(b) _____ An echelon form of a matrix is unique.

(c) _____ If A is a 4×2 matrix, then $A\boldsymbol{x} = \mathbf{0}$ has at least two free variables.

(d) _____ $A^2 - B^2 = (A - B)(A + B)$ for all square $n \times n$ matrices A and B.

(e) _____ For A and 4×6 matrix, let E be the matrix so that EA is the result of the row op $R_1 - 3R_2 \to R_1$ applied to A. Then the first row of E is $\begin{bmatrix} 1 & -3 & 0 \end{bmatrix}$.

Problem 2 (25 points)**.** Solve $A\boldsymbol{x} = \mathbf{0}$ for

$$A = \begin{bmatrix} 4 & 8 & 5 & -3 \\ 5 & 10 & 2 & -8 \\ -3 & -6 & -4 & 2 \end{bmatrix}$$

Follow the procedure discussed in class

- Use elementary row ops to reduce to an echelon matrix.
- Write down the resulting triangular system.
- Use back-substitution to solve.
- Write out your solution as a linear combination of vectors.

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