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7 February 2023
Due Tusday 14 February 2023, 9:30 am

Linear Algebra, Math 2101-002
Homework set #5

1. Let

$$A = \begin{bmatrix} 4 & -8 & 5 \\ 4 & -7 & 4 \\ 3 & -4 & 2 \end{bmatrix}.$$

(a) Exhibit A^{-1}. (Hint, go back to problem 1.2.5 in homework set #1).
(b) Check that $AA^{-1} = A^{-1}A = I$.
(c) Compute A^T, and check that $(A^T)^{-1} = (A^{-1})^T$.

2. Let

$$Q = \frac{1}{\sqrt{2}} \begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix}.$$

(a) Compute Q^2.
(b) Exhibit Q^{-1}.

3. (a) Let A is as in part 1, and $b = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$. Find the solution to $Ax = b$ using two different methods, first using Gaussian elimination (forward elimination and back substitution), and then by computing $A^{-1}b$.
(b) Why is this solution unique?