Week 9
MATH 33A
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5.3.33 Find all orthogonal 2×2 matrices.

5.3.37 Is there an orthogonal transformation T from $\mathbb{R}^3$ to itself such that $T \begin{bmatrix} 2 \\ 3 \\ 0 \end{bmatrix} = \begin{bmatrix} 3 \\ 0 \\ 2 \end{bmatrix}$ and $T \begin{bmatrix} -3 \\ 2 \\ 0 \end{bmatrix} = \begin{bmatrix} 2 \\ -3 \\ 0 \end{bmatrix}$?

5.3.44 Consider an $n \times m$ matrix A. Find $\dim(Im(A)) + \dim(\ker(A^T))$ in terms of m and n.

5.4.18 Does the equation $rank(A^T A) = rank(AA^T)$ hold for all $n \times m$ matrices A?

5.4.22 Find the least squares solution x^* of the system $Ax = b$, where $A = \begin{bmatrix} 3 & 2 \\ 5 & 3 \\ 4 & 5 \end{bmatrix}$ and $b = \begin{bmatrix} 5 \\ 9 \\ 2 \end{bmatrix}$. Determine the error $||b - Ax^*||$.

6.1.30 Let $A = \begin{bmatrix} 4 & 2 & 0 \\ 4 & 6 & 0 \\ 5 & 2 & 3 \end{bmatrix}$. Find λ such that $A - \lambda I$ fails to be invertible.