Linear Optimization
Math 354 Section 03 Homework 1
Linear Algebra Review

Guidelines.

- Please staple work.
- Late work not accepted.
- Responses should be direct and clear for the sake of the grader.

Problem 1. Show that jth column of AB is given by AB_j, where B_j is the jth column of B.

Problem 2. Show that if $Ax = b$ has more than one solution, then it has infinitely many solutions.

Problem 3. Let $A = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}$.

(A) Show the column vectors of A furnish a basis for $\mathbb{R}^3$.

(B) Express the vector $b = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$ as a linear combination of the columns of A.

(C) State your answer from B using the equation $Ax = b$, explaining how the coefficients in part (B) correspond to the vector $x \in \mathbb{R}^3$.

Problem 4. Prove that any $n+1$ vectors in $\mathbb{R}^n$ must be linearly dependent.

Problem 5. Let A be an $n \times n$ matrix. Show that A is nonsingular if and only if it is the product of elementary matrices.

Suggested Problems (Do not turn in.): Section 0.5: 1, 5, 18, 19