

Math 250, Homework 6, Due 03/11/05

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Problem 0 Do the following problems from the book:

Section 4.1 : 8, 12, 13, 14, 29, 33, 35, 38, 39, 40, 42, 44.

Problem 1 Let X and Y be two subspaces of \mathbb{R}^n . Let $X + Y = \{x + y | x \in X, y \in Y\}$. Prove that $X + Y$ is a subspace of \mathbb{R}^n . Moreover if S_X and S_Y are spanning sets of X and Y , respectively, show that $S_X \cup S_Y$ is the spanning set for $X + Y$.

Problem 2 Let A_1 and A_2 be two $n \times n$ matrices such that $\text{Null}(A_1) = \text{Col}(A_2)$. Let A be the $2n \times n$ matrix obtained by placing A_1 on top of A_2 . Prove that A is invertible.

Bonus problem: Can replace 5 other problems: Calculate the determinant of the following matrix.

$$\begin{pmatrix} 1 & 1 & 1 & \dots & 1 \\ x_0 & x_1 & x_2 & \dots & x_{n-1} \\ x_0^2 & x_1^2 & x_2^2 & \dots & x_{n-1}^2 \\ \dots & \dots & \dots & \dots & \dots \\ x_0^{n-1} & x_1^{n-1} & x_2^{n-1} & \dots & x_{n-1}^{n-1} \end{pmatrix}$$