

SECTION 2.3.3: VECTOR SPACES AND LINEAR SYSTEMS

1. **definition** The *row space* of a matrix is

The *row rank* is

2. Lemma 3.3 & 3.4: Let A' be the reduced row echelon form of matrix A . The rows of A' are

3. **definition** The *column space* of a matrix is

The *column rank* is

4. **definition** The *transpose* of a matrix is

5. Lemma 3.10: Row operations do not change

6. Theorem: For any matrix, what is the relationship between row rank and column rank of matrices?

7. **definition** The *rank* of a matrix is

8. Theorem: For linear systems with n unknowns and with coefficient matrix A the following statements are equivalent.

9. Corollary: For the $n \times n$ matrix A , the following are equivalent.