Last name	
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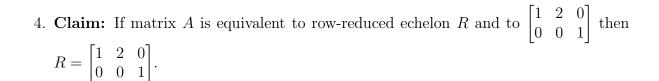
## LARSON—MATH 601—CLASSROOM WORKSHEET 17 Linear Transformations.

## Concepts & Notation

- (Sec. 2.4) ordered basis, coordinates, coordinate matrix,  $[\alpha]_{\mathcal{B}}$ .
- (Sec. 2.5) row rank.
- (Sec. 3.1) linear transformation, rank, nullity.
- 1. What is the *row space* of a matrix? Why is it a vector space? Describe the row space of  $\begin{bmatrix} 1 & 2 & 3 & 4 \\ 2 & 4 & 6 & 8 \\ 0 & 0 & 1 & 1 \end{bmatrix}.$

2. What is the *row rank* of a matrix? Find the row rank of  $\begin{bmatrix} 1 & 2 & 3 & 4 \\ 2 & 4 & 6 & 8 \\ 0 & 0 & 1 & 1 \end{bmatrix}$ .

3. Claim: Row-equivalent matrices have the same row-space.



5. What is a linear transformation T from a vector space V into a vector space W? What is the null space of T? What is the range of T?

6. What is the zero transformation 0 from a vector space V to a vector space W? Show it is a linear transformation. Find the null space of 0. Find the range of 0.

7. What are the rank and nullity of a linear transformation T? Assume V and W are finite dimensional vector spaces. What is the rank and nullity of the zero transformation 0?

8. What is the identity transformation I from a vector space V to itself? Show it is a linear transformation. Find the kernel, range, rank and nullity of I.