Last name ______________________

First name ______________________

LARSON—MATH 601—CLASSROOM WORKSHEET 16
Coordinates, Row Equivalence.

Concepts & Notation

- (Sec. 2.4) *ordered basis*, *coordinates*, *coordinate matrix*, $[\alpha]_{\mathcal{B}}$.
- (Sec. 2.5) *row rank*.

1. **Explain:** For a vector space V with bases $\mathcal{B}$ and $\mathcal{B}'$, and vector $\alpha \in V$, there is an invertible matrix P such that $[\alpha]_{\mathcal{B}} = P[\alpha]_{\mathcal{B}'}$.

2. **Claim:** If V is a vector space V over a field $\mathbb{F}$ with basis $\mathcal{B}$ and P is an invertible $n \times n$ matrix then there is a unique ordered basis $\mathcal{B}'$ of V so that $[\alpha]_{\mathcal{B}} = P[\alpha]_{\mathcal{B}'}$.

3. What is the *row space* of a matrix? Why is it a vector space? Describe the row space of $\begin{bmatrix} 1 & 2 & 3 & 4 \\ 2 & 4 & 6 & 8 \\ 0 & 0 & 1 & 1 \end{bmatrix}$.

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

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

6. **Claim:** If matrix A is equivalent to row-reduced echelon R and to $\begin{bmatrix} 1 & 2 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ then $R = \begin{bmatrix} 1 & 2 & 0 \\ 0 & 0 & 1 \end{bmatrix}$.