Last name _____

First name _____

LARSON—MATH 310—CLASSROOM WORKSHEET 21
Determinants.

Review

The *determinant* of a square triangular matrix is the product of its diagonal entries.

Facts about a square matrix A. The following statements are all equivalent!

- RREF of A has a zero row.
- Any triangular matrix derived from A has a 0 on the diagonal.
- The rows of A are linearly dependent.
- A does not have an inverse.
- $\det(A) = 0$.

1. Find $\begin{vmatrix} 2 & 0 \\ 4 & 3 \end{vmatrix}$.

2. Find $\begin{vmatrix} 2 & 1 \\ 0 & 3 \end{vmatrix}$.

$$\begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - cb.$$

3. Find $\begin{vmatrix} 2 & 1 \\ 5 & 3 \end{vmatrix}$.

4. Find $\begin{vmatrix} 2 & 2 \\ 1 & 1 \end{vmatrix}$.

Determinant Computation Rules

- The determinant of a square matrix A equals the determinant of any matrix formed by a pivot operation.
- The determinant of a square matrix A equals *negative* the determinant of any matrix formed by switching 2 rows.

5. Find $\begin{vmatrix} 1 & 1 & 1 \\ 2 & 2 & 1 \\ 0 & 0 & 5 \end{vmatrix}$.

6. Find $\begin{vmatrix} 1 & 1 & 1 \\ 0 & 0 & 5 \\ 2 & 2 & 2 \end{vmatrix}$.

7. Find $\begin{vmatrix} 4 & 5 & 6 \\ 1 & 2 & 3 \\ 0 & 0 & 7 \end{vmatrix}$.

8. Find $\begin{vmatrix} 4 & 5 & 6 & 7 \\ 1 & 2 & 3 & 4 \\ 8 & 9 & 9 & 8 \\ 0 & 0 & 0 & 0 \end{vmatrix}$.

9. Find $\begin{vmatrix} 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \end{vmatrix}$.