Name: ____ Date: ___________

PCH: Matrices Intro Ms. Loughran

A **matrix** is a rectangular array of numbers

An $m \times n$ matrix has m rows (across) and n columns (down). Each number is an entry.

Examples:

2×2 matrix $\begin{bmatrix} 5 & 2 \\ 0 & -1 \end{bmatrix}$ 3×1 matrix $\begin{bmatrix} 3 \\ 8 \\ -1 \end{bmatrix}$ 1×4 matrix $\begin{bmatrix} 1 & -3 & 0 & 4 \end{bmatrix}$

If $m = n$ then it is called a square matrix.

We can perform elementary operations on matrices. We can:

1. interchange two rows
2. multiply a row by a nonzero constant
3. add a multiple of one row to another row

Notice that these are the same operations that we used when we solved systems of equations.

Two matrices are row equivalent if one can be obtained from the other by a sequence of elementary row operations.

Let's practice some row operations.

1. $\begin{bmatrix} 0 & 1 & 3 & 4 \\ -1 & 2 & 0 & 3 \\ 2 & -3 & 4 & 1 \end{bmatrix}$ Switch 1^{st} row (R_1) and 2^{nd} row (R_2)

2. $\begin{bmatrix} 2 & -4 & 6 & -2 \\ 1 & 3 & -3 & 0 \\ 5 & -2 & 1 & 2 \end{bmatrix}$ Multiply R_1 by $\frac{1}{2}$

3. $\begin{bmatrix} 1 & 2 & -4 & 3 \\ 0 & 3 & -2 & -1 \\ 2 & 1 & 5 & -2 \end{bmatrix}$ Add $-2R_1$ to R_3

4. Given: $\begin{bmatrix} 1 & 0 & -5 & 3 \\ 3 & 2 & -1 & 7 \\ 4 & -2 & -3 & 1 \end{bmatrix}$

(a) Interchange R_1 and R_3. Label the new matrix as B.

(b) Multiply R_3 of matrix B by 2. Label the new matrix as C.

(c) In matrix C, add $-3R_2$ to R_1. Label the new matrix as D.

Practice

1. Given: $\begin{bmatrix} 3 & -2 & 4 \\ 1 & 1 & -2 \\ 2 & -3 & 6 \end{bmatrix}$

(a) Multiply R_2 by -1. Label the new matrix as G.

(b) Using G add 2 times R_1 to R_3. Label the new matrix as H.

(c) Interchange R_2 and R_3 of H. Label the new matrix as J.

(d) Using J, add R_1 to R_2. Label the new matrix as K.

2. Given: $\begin{bmatrix} 1 & -2 & 3 & 9 \\ -1 & 3 & 0 & -4 \\ 2 & -5 & 5 & 17 \end{bmatrix}$

(a) Add R_1 to R_2. Label the new matrix as L.

(b) Using L, add $-2R_1$ to R_3. Label the new matrix as P.

(c) Using P, add R_2 to R_3. Label the new matrix as S.

(d) Using S, multiply R_3 by $\frac{1}{2}$. Label the new matrix as T.