Worksheet: Matrices 2
Mr. Chvatal **Name:_____ Date:_____**

The determinate of a matrix. Let $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ and $\det(A) = ad - bc$, where det(*A*) is the determinate of *A*. Matrix *A* has an inverse if and only if $ad - bc \neq 0$. Determinates of larger *n* x *n* matrices can be calculated in the same way: take the sum of the products of the "down" (\) diagonals and subtract the sum of the products of the "up" diagonals (/).

The identity matrix. Let *A* be a square matrix with *n* rows and *n* columns. The identity matrix, *I*, is a matrix with the same dimensions as *A* with 1s on the main diagonal and 0s elsewhere, where $AI = IA = A$.

The inverse of a matrix. Let *A* and *B* be square matrices with *n* rows and *n* columns. *A* and *B* are inverses of one another if and only if $AB = I = BA$, where *I* is the identity matrix. The inverse of matrix *A* is denoted by A^{-1}.

Determine if each matrix has an inverse by finding its determinate.

1. $A = \begin{pmatrix} -3 & 4 \\ 2 & 5 \end{pmatrix}$

2. $B = \begin{pmatrix} -3 & 2 \\ -6 & 4 \end{pmatrix}$

3. $C = \begin{pmatrix} 6 & 2 & -4 \\ 0 & 0 & 1 \\ 12 & -9 & 3 \end{pmatrix}$

4. $D = \begin{pmatrix} 3 & 1 & -6 \\ -5 & 2 & 10 \\ 4 & 2 & -8 \end{pmatrix}$

5. Show that matrices A and B are inverses of each other.

$$A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix} \qquad B = \begin{pmatrix} -2 & 1 \\ \frac{3}{2} & -\frac{1}{2} \end{pmatrix}$$

6. Show that matrices C and D are inverses of each other.

$$C = \begin{pmatrix} -2 & 2 & -1 \\ 3 & -5 & 4 \\ 5 & -6 & 4 \end{pmatrix} \qquad D = \begin{pmatrix} 4 & -2 & 3 \\ 8 & -3 & 5 \\ 7 & -2 & 4 \end{pmatrix}$$

Use your calculator to find the inverses of each matrix.

7. $A = \begin{pmatrix} 3 & -2 & 4 \\ 5 & 6 & 13 \\ 5 & -5 & -7 \end{pmatrix}$

8. $B = \begin{pmatrix} 1 & 11 & -16 \\ -2 & 2 & 1 \\ 7 & 2 & -4 \end{pmatrix}$