Algebra II Lesson 3x3: Matrices, Determinants, and Inverses Mrs. Snow, Instructor

The computations for 3×3 determinants are messier than for 2×2 's. Various methods can be used, but the simplest method is probably the following:

- 1) Write down the determinant
- 2) Expand the determinant by rewriting the first two columns of numbers
- 3) Multiply along the down-to-the-right-diagonals, and then add them up. >
- 4) Multiply along the down-to-the-left-diagonals and then add these values up. 🖌
- 5) Lastly subtract the down-right-diagonal total from the down to the left diagonal total.

Example:



FIND THE DETERMINANT FOR THE FOLLOWING MATRICES: (by hand)



$\begin{bmatrix} 1 & 2 & 5 \\ 3 & 1 & 0 \\ 1 & 2 & 1 \end{bmatrix}$

Calculator Method

Determinants:

A 3x3 determinant may be calculated on a calculator using!!!

Remember

YOU MUST BE ABLE TO CALCULATE DETERMINANTS WITHOUT THE AID OF A

CALCULATOR!!!!

- 1. Press MATRIX $(2^{nd} x^{-1}) >>$ to EDIT. Down to 1:[A]. ENTER
- 2. Enter the matrix dimensions: # rows ENTER # columns ENTER.
- 3. Enter the matrix data.
- 4. Press 2nd MODE (QUIT)
- 5. Press MATRIX again. Go right once to MATH. Down to 1:det.
- 6. Press **MATRIX** again. Down to **1:[A]. ENTER**. Answer is displayed.

Inverses:

- 1. Using a calculator, enter the data for your matrix
- 2. Now to calculate the inverse hit **2nd MATRIX** select the matrix you want the inverse for and hit **ENTER**
- 3. Hit x⁻¹ The view screen will show: [A]⁻¹
- 4. **ENTER** the view screen will give the matrix inverse of your matrix.

Find the inverse of the matrices:

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

Soloving a 3X3 Matrix Equation

$$AX = B \qquad X = A^{-1}B$$

Yes, we use the calculator.

- 1. Enter your matrix data into the calculator. Enter the 3x3 data into matrix A and the 3x1 data into matrix B.
- 2. Now to calculate the inverse hit **2nd MATRIX** select the matrix you want the inverse for and hit **ENTER**
- 3. Hit \mathbf{x}^{-1} The view screen will show: $[\mathbf{A}]^{-1}$
- With the matrix inverse on the screen hit (times)2nd Matrix [B] ENTER Will see: [A]⁻¹[B] hit ENTER one more time.
- 5. The resulting matrix will be our answer, the matrix that equals X.

ORDER COUNTS! [B] [A]⁻¹ WILL NOT WORK!!!

