## Basketweave Method for determinants

Instead of calculating a determinant by cofactors, we can find the determinant using the basketweave method **for 2x2 and 3x3 matrices ONLY**.  Here we add the diagonal product of a square matrix as we go left to right and subtract the diagonal product as we go right to left.  The resulting value will be the value of the determinant!

**Example: 2x2 matrix**

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

So we first add the diagonal product going from left to right:  $+[(1)((5)] = 5$

Next we subtract the diagonal product going from right to left:  $-[(-3)(2)] = -[-6] = 6$

Now add the results to get the determinant:  $5 + 6 = 11$

For larger matrices, it is the same process, except we need to recopy all but one column of the matrix to the right of the original matrix and then do the basketweave method:

**Example: 3x3 matrix**

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

Now recopy the first two columns of the original matrix to the right of the original matrix:

$$\begin{vmatrix} 1 & -3 & 4 \\ 2 & 5 & -1 \\ -2 & 3 & -4 \end{vmatrix} \begin{matrix} 1 & -3 \\ 2 & 5 \\ -2 & 3 \end{matrix}$$

Do the basketweave method – add the diagonal products going left to right:
$$+[(1)(5)(-4) + (-3)(-1)(-2) + (4)(2)(3)] = +[-20 + (-6) + 24] = -2$$

Next take the negative of the sum of the diagonal products going right to left:
$$-[(-3)(2)(-4) + (1)(-1)(3) + (4)(5)(-2)] = -[24 + (-3) + (-40)] = -[-19] = 19$$

Add the two sums together:
$$-2 + 19 = 17$$

So the original matrix has a determinant of 17.

## Calculating determinants/getting row echelon form of a matrix with a TI-89 Titanium in the Data/Matrix Editor

1. On your Apps screen, go to Data/Matrix Editor and press enter
2. Select "New" (or "Current" if you already have one made) and press enter
3. Under "Type" press the right arrow and select 'Matrix'
4. Under Variable enter some variable(s) for the matrix AND REMEMBER IT!! Ie "xyz" or something similar
5. For row and column, press "ALPHA" three times then enter the row and column dimensions. Press Enter when done
6. Enter the matrix.  When done press "HOME".
7. In your home screen press "2nd" then "5"
8. Select Matrix then either "det(" for determinant, "ref(" for row echelon form, or "rref(" for reduced row echelon form
9. Then enter the variable you used for the matrix, close the parenthesis and press enter