Triangle in the Matrix

TriangleInMatrix.tns

Name _____

Class _____

Problem 1 – Testing the Formula

A triangle can be represented as a matrix

$\begin{bmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{bmatrix}$, where (x_n, y_n) is a vertex of the triangle.

Therefore, the **area** of the triangle is given by $A = \pm \dfrac{1}{2} \begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix}$.

Note that the straight lines of the matrix indicate that you should calculate the *determinant* of the matrix.

- Use this equation to find the area of the right triangle on page 1.3. What is the area?

- Check your answer to the equation by finding the area of the triangle using the geometry formula, $A = \dfrac{1}{2} \cdot b \cdot h$.

- Why do you think the $\pm$ is needed?
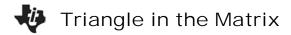
Problem 2 – Practice Problems

Find the area of the triangles on pages 2.2 and 2.3 using matrices on the *Calculator* application.

Check the area by moving to the *Graphs* application with the triangle. Press **MENU > Geometry > Measurement > Area.** When the entire triangle flashes, press enter.

Page 2.2

Matrix Representation of Triangle

Page 2.3

Matrix Representation of Triangle

Area =

Area =

Extension – Fencing a Garden

A gardener is trying to find a triangular area behind his house that encloses 1,750 square feet. He has placed the first two fence posts at (0, 50) and (40, 0). The final fence post is on the property line at $y = 100$. Find the point where the gardener can place the final fence post. Show your work.