Problem 1 – Determinants

On page 1.3, study the matrix and the determinant. Change an entry in the matrix and observe how the determinant changes. Continue to do this until you can establish a rule for finding the determinant of a two-by-two matrix.

- What is your rule?

Move to page 1.5 and find $\det\begin{bmatrix} -1 & 5 \\ 6 & 8 \end{bmatrix}$, first by using the rule, and second, by using the **det(** command, followed by the matrix. You can find templates for matrices above the multiplication key ([ctrl] + [templates]).

- Create a matrix that has a determinant of 0.

- Create a matrix that has a determinant of 1.

- Create a matrix that has a determinant of $\frac{1}{2}$.

Problem 2 – Cramer's Rule

For a system of two equations written in standard form, $\begin{cases} a_1x + b_1y = c_1 \\ a_2x + b_2y = c_2 \end{cases}$, the solution of the system is (x, y) where $x = \dfrac{\det\begin{bmatrix} c_1 & b_1 \\ c_2 & b_2 \end{bmatrix}}{D}$, $y = \dfrac{\det\begin{bmatrix} a_1 & c_1 \\ a_2 & c_2 \end{bmatrix}}{D}$, and D is the determinant of the coefficient matrix, $\begin{bmatrix} a_1 & b_1 \\ a_2 & b_2 \end{bmatrix}$.

Move to page 2.2 and use Cramer's Rule to find the solution of $\begin{cases} -x + 2y = 10 \\ 3x + 4y = -4 \end{cases}$.

- What is *D*?
- What is the numerator of *x*?
- What is the numerator of *y*?
- What is the solution to the system?

Move to page 3.2 and use Cramer's Rule to find the solution of $\begin{cases} -3x + 2y = 8 \\ -3x + 2y = 12 \end{cases}$.

- What is *D*?
- What is the numerator of *x*?
- What is the numerator of *y*?
- What is the solution to the system?

Move to page 4.2 and use Cramer's Rule to find the solution of $\begin{cases} 4x - 2y = 8 \\ 8x - 4y = 16 \end{cases}$.

- What is *D*?
- What is the numerator of *x*?
- What is the numerator of *y*?
- What is the solution to the system?

- How can you use Cramer's Rule to tell if a system of linear equations has one, zero, or infinitely many solutions?

