



James Madison
HIGH SCHOOL

Determinants



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Determinant - a square array of numbers or variables enclosed between parallel vertical bars.

****To find a determinant you must have a *SQUARE MATRIX!!*****

Finding a 2 x 2 determinant:

$$\begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - bc$$




Find the determinant:

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$$1. \begin{vmatrix} -5 & -7 \\ 11 & 8 \end{vmatrix} = -5(8) - (-7)(11) = -40 - (-77)$$


$$-40 + 77 = \boxed{37}$$

$$2. \begin{vmatrix} 3 & 2 \\ -1 & 5 \end{vmatrix} = 3(5) - (2)(-1) = 15 - (-2)$$


$$15 + 2 = \boxed{17}$$



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$$3. \begin{vmatrix} 1 & 0 & -2 \\ 0 & 0 & -3 \end{vmatrix} = 10(-3) - (-2)(0)$$

$$= -30 + 0 = \boxed{-30}$$

Finding a 3x3 determinant: Diagonal method

$$4. \begin{vmatrix} -2 & 3 & 8 \\ 6 & 7 & -1 \\ -4 & 5 & 9 \end{vmatrix}$$

Step 1: Rewrite first two rows of the matrix.



4.
$$\begin{vmatrix} -2 & 3 & 8 \\ 6 & 7 & -1 \\ -4 & 5 & 9 \end{vmatrix} \begin{vmatrix} -2 & 3 \\ 6 & 7 \\ -4 & 5 \end{vmatrix}$$

$$-224 + 10 + 162 = -52$$

Step 2: multiply
diagonals going up!

Step 2: multiply
diagonals going down!

$$-126 + 12 + 240 = 126$$

$$126 - (-52)$$

$$126 + 52$$

$$\boxed{= 178}$$

Step 3: Bottom
minus top!



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

$$-18 + 50 + 6 = 38$$

Step 2: multiply diagonals going up!

Step 2: multiply diagonals going down!

$$45 - 15 + 8 = 38$$

$$38 - 38$$

$$= 0$$

Step 3: Bottom minus top!