

# Honors Algebra 2 Notes

## 3.7 Evaluate Determinants

Name Key

**Determinant:** a real number associated with any square matrix  
**Notation:** determinant of matrix  $A$  is denoted by  $|A|$  or by  $\det A$

Every Square matrix ( $n \times n$ ) has a determinant.

**KEY CONCEPT** *For Your Notebook*

**The Determinant of a Matrix**

**Determinant of a  $2 \times 2$  Matrix**

$$\det \begin{bmatrix} a & b \\ c & d \end{bmatrix} = \begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - cb$$

The determinant of a  $2 \times 2$  matrix is the difference of the products of the elements on the diagonals.

**Determinant of a  $3 \times 3$  Matrix**

**STEP 1** Repeat the first two columns to the right of the determinant.

**STEP 2** Subtract the sum of the red products from the sum of the blue products.

$$\det \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix} = \begin{vmatrix} a & b & c & a & b \\ d & e & f & d & e \\ g & h & i & g & h \end{vmatrix} = (aet + bfg + cdh) - (gec + hfa + idb)$$

Evaluate the determinant of each matrix:

**\*Always subtract the products \*WATCH YOUR SIGNS!!!**

<p>1. <math>\begin{vmatrix} 9 &amp; 4 \\ 3 &amp; 5 \end{vmatrix} = 9(5) - 3(4)</math>  <math>45 - 12</math>  <math>\boxed{33}</math></p>	<p>2. <math>\begin{vmatrix} -2 &amp; 7 \\ -5 &amp; 8 \end{vmatrix} = (-2)(8) - (-5)(7)</math>  <math>-16 + 35</math>  <math>\boxed{19}</math></p>
<p>3. <math>\begin{vmatrix} 2 &amp; -1 &amp; -3 \\ 4 &amp; 1 &amp; 0 \\ 3 &amp; -4 &amp; -2 \end{vmatrix} = (2)(1)(-2) + (-1)(0)(3) + (-3)(4)(-4) - [(-3)(1)(3) + (-4)(0)(2) + (-2)(4)(-1)]</math>  <math>= [-4 + 0 + 48] - [-9 + 0 + 8]</math>  <math>= 44 - (-1)</math>  <math>\boxed{45}</math></p>	<p>4. <math>\begin{vmatrix} 4 &amp; -1 &amp; -2 \\ -3 &amp; -2 &amp; -1 \\ 0 &amp; 5 &amp; 1 \end{vmatrix} = (4)(-8) + 0 + (-30) - [0 + (-20) + 3]</math>  <math>= (-38) - (-17)</math>  <math>= \boxed{-21}</math></p>