

Warm-up

January 23, 2017

Multiply.

① $\begin{bmatrix} 3 & 0 & -1 \\ 2 & 5 & 3 \end{bmatrix} \cdot \begin{bmatrix} 3 \\ -2 \\ 1 \end{bmatrix}$

$$3(3) + 0(-2) + -1(1)$$

$$9 + 0 + -1$$

$2 \times 3 \checkmark 3 \times 1$

$$\frac{8}{2(3) + 5(-2) + 3(1)}$$

$$\frac{8}{6 + -10 + 3}$$

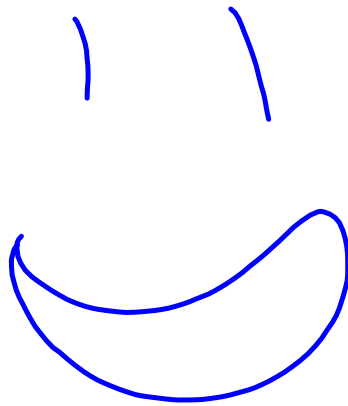
$$\frac{8}{-1}$$

$$\begin{bmatrix} 8 \\ -1 \\ -1 \end{bmatrix}$$

② $\begin{bmatrix} 3 \\ -2 \\ 1 \end{bmatrix} \cdot \begin{bmatrix} 3 & 0 & -1 \\ 2 & 5 & 3 \end{bmatrix}$

$3 \times (1 + 2) \times 3$

undefined



Monday
celebration

$$\begin{bmatrix} 0 & -3 \end{bmatrix} \cdot \begin{bmatrix} 3 & 4 \\ -1 & 7 \end{bmatrix}$$

1 × 2 ✓ 2 × 2

$$\begin{bmatrix} 0(3) + -3(-1) & 0(4) + -3(7) \\ \underline{3} & \underline{-21} \end{bmatrix} = \begin{bmatrix} 3 & -21 \end{bmatrix}$$

Determinants

↳ Determine if an inverse exists

$$\det \begin{pmatrix} a & b \\ c & d \end{pmatrix} = \begin{matrix} + \\ - \end{matrix} \left| \begin{array}{cc} a & b \\ c & d \end{array} \right| = ad - cb$$

If $\det = 0$,
then no inverse.

$$\begin{array}{r}
 + \\
 -
 \end{array}
 \left| \begin{array}{cc}
 1 & 0 \\
 2 & -4
 \end{array} \right|
 = 1(-4) - 2(0)$$

$$= -4 - 0$$

$$-4$$

$$\begin{array}{r}
 > \\
 >
 \end{array}
 \left| \begin{array}{cc}
 -5 & 2 \\
 -2 & -5
 \end{array} \right|
 = (-5)(-5) - (-2)(2)$$

$$= 25 - -4$$

$$= 29$$

$$\begin{vmatrix} a & b & c \\ d & e & f \\ g & h & i \end{vmatrix} - \begin{vmatrix} a & b \\ d & e \\ g & h \end{vmatrix}$$

1. rewrite first 2 columns
2. Add the products going down
Subtract products going up

$$(aei + bfg + cdh) - (gec + hfa + idb)$$

16.

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

$$(-10 + 36 + 40) - (32 + 75 + 6)$$

$$(-6) - (-49)$$

$$\boxed{43}$$

Determinants

↳ determines if an inverse exists

$$\det \begin{pmatrix} a & b \\ c & d \end{pmatrix} = \begin{matrix} + \\ - \end{matrix} \left| \begin{matrix} a & b \\ c & d \end{matrix} \right| = ad - cb$$

If $\det = 0$, no inverse

$$+ \begin{vmatrix} 4 & 6 \\ 0 & 3 \end{vmatrix} = 4(3) - 0(6)$$
$$12 - 0$$
$$\boxed{12}$$

$$ad - cb$$
$$(-5)(-5) - (2)(-2)$$
$$25 - -4$$
$$25 + 4$$
$$29$$

$$\begin{vmatrix} 3 & 7 \\ 0 & 5 \end{vmatrix}$$

2x2

$$\begin{aligned} &= 3(5) - 0(7) \\ &= 15 - 0 \\ &= 15 \end{aligned}$$

$$\textcircled{1} \begin{vmatrix} 1 & 0 \\ 2 & -4 \end{vmatrix} = \begin{aligned} &1(-4) - 2(0) \\ &-4 - 0 \\ &-4 \end{aligned}$$

3x3

$$\begin{array}{c}
 + \\
 | \\
 - \\
 |
 \end{array}
 \begin{array}{ccc|ccc}
 a & b & c & a & b \\
 d & e & f & d & e \\
 g & h & i & g & h
 \end{array}$$

$(aei + bfg + cdh) - (g ec + h fa + idb)$

① Rewrite the first two columns.

② Add products going down. Subtract products going up.

$$\begin{vmatrix} a & b & c \\ d & e & f \\ g & h & i \end{vmatrix} \begin{vmatrix} a & b \\ d & e \\ g & h \end{vmatrix}$$

1. rewrite first 2 columns
2. add products going down
subtract products going up

$$(aei + bfg + cdh) - (gec + hfa + idb)$$

$$\begin{array}{c|ccc|cc} \textcircled{16} & 5 & 3 & -4 & 5 & 3 \\ & -2 & -2 & -3 & -2 & -2 \\ & 4 & 5 & 1 & 4 & 5 \end{array}$$

$$(-10 + -36 + 40) - (32 + -75 + -6)$$

$$(-6) - (-49)$$

$$43$$

$$\begin{vmatrix} 4 & -2 & 3 \\ 0 & 7 & 1 \\ -6 & -3 & 5 \end{vmatrix}$$

$$\textcircled{16} \begin{array}{ccc|cc} 5 & 3 & -4 & 5 & 3 \\ -2 & -2 & -3 & -2 & -2 \\ 4 & 5 & 1 & 4 & 5 \end{array}$$

$$A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$$

Inverses

$$\textcircled{1} \det(A) = ad - cb$$

$$\textcircled{2} A^{-1} = \frac{1}{\det(A)} \begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$$

$$A = \begin{bmatrix} 1 & -4 \\ -4 & -7 \end{bmatrix}$$

$$\begin{aligned} 1. \det(A) &= 1(-7) - (-4)(4) \\ &= -7 - -16 \\ &= 9 \end{aligned}$$

$$A^{-1} = \frac{1}{9} \begin{bmatrix} -7 & 4 \\ -4 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} -7/9 & 4/9 \\ -4/9 & 1/9 \end{bmatrix}$$

