10-4 Reteach to Build Understanding

Inverses and Determinants

1. Find the inverse of $A = \begin{bmatrix} 2 & 4 \\ 3 & 0 \end{bmatrix}$.

If you multiply a 2 × 2 matrix by its inverse, the result is $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$.

Suppose the inverse for matrix $\begin{bmatrix} a & c \\ b & d \end{bmatrix}$ is a matrix $\begin{bmatrix} w & x \\ y & z \end{bmatrix}$.

The equation is

$$\begin{bmatrix} a & c \\ b & d \end{bmatrix} \cdot \begin{bmatrix} w & x \\ y & z \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \rightarrow \begin{bmatrix} aw + cy & ax + cz \\ bw + dy & bx + dz \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

a. Use the equations to solve for the value of w, x, y, and z.

Equations (see above)	Write out with known numbers.	Simplify the equations.	Solution
$bw + dy$	$3w + \_\,y = 0$	$3w = 0$ Divide each side by 3.	$w = 0$
$aw + cy$	$\_w + 4y = 1$	$2w + \_\,y = 1$ Substitute 0 for w. $2(0) + 4y = 1$ $\_y = 1$ Divide each side by 4.	$y = \frac{1}{4}$
$bx + dz$	$3x + 0z = 1$	$\_x = 1$ Divide each side by 3.	$x = \frac{1}{3}$
$ax + cz$	$\_x + 4z = 0$	$2x + \_\,z = 0$ Substitute $\frac{1}{3}$ for x. $2(\ ) + 4z = 0$ $\underline{}$ $\frac{2}{3} + 4z = 0$ Subtract $\frac{2}{3}$ from each side. $4z = -\frac{2}{3}$ Divide each side by 4.	$z = -\frac{2}{12} = -\frac{1}{6}$

b. Complete the matrix for the inverse: $A^{-1} = \begin{bmatrix} w & x \\ y & z \end{bmatrix} = \begin{bmatrix} \_ & \_ \\ \_ & \_ \end{bmatrix}$

2. Enrique solved for the determinant of $B = \begin{bmatrix} 3 & 2 \\ 4 & 5 \end{bmatrix}$ as shown.

What error did he make? What is the correct answer?

$3(5) + 2(4) = ?$

$15 + 8 = 23$