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Math worksheet on *'Matrices - Row Operations for Finding Inverse of Matrix (3x3) (Level 1)'*. Part of a broader unit on *'Matrices'*

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1 Multiply row 3 of the augmented matrix by whatever factor is needed to solve for that row of the inverse matrix

$$\begin{bmatrix} 7 & 5 & 5 & | & 1 & 0 & 0 \\ 6 & 5 & 3 & | & 0 & 1 & 0 \\ 0 & 0 & 0.25 & | & 0 & 0 & 1 \end{bmatrix}$$

a
$$\begin{bmatrix} 7 & 5 & 5 & | & 1 & 0 & 0 \\ 6 & 5 & 3 & | & 0 & 1 & 0 \\ 0 & 0 & 0.06 & | & 0 & 0 & 6 \end{bmatrix}$$
b
$$\begin{bmatrix} 7 & 5 & 5 & | & 1 & 0 & 0 \\ 6 & 5 & 3 & | & 0 & 1 & 0 \\ 0 & 0 & 0.06 & | & 0 & 0 & -2 \end{bmatrix}$$
c
$$\begin{bmatrix} 7 & 5 & 5 & | & 1 & 0 & 0 \\ 6 & 5 & 3 & | & 0 & 1 & 0 \\ 0 & 0 & 0.06 & | & 0 & 0 & 5 \end{bmatrix}$$
d
$$\begin{bmatrix} 7 & 5 & 5 & | & 1 & 0 & 0 \\ 6 & 5 & 3 & | & 0 & 1 & 0 \\ 0 & 0 & 1 & | & 0 & 0 & 4 \end{bmatrix}$$
e
$$\begin{bmatrix} 7 & 5 & 5 & | & 1 & 0 & 0 \\ 6 & 5 & 3 & | & 0 & 1 & 0 \\ 0 & 0 & 0.06 & | & 0 & 0 & 3 \end{bmatrix}$$
f
$$\begin{bmatrix} 7 & 5 & 5 & | & 1 & 0 & 0 \\ 6 & 5 & 3 & | & 0 & 1 & 0 \\ 0 & 0 & 0.06 & | & 0 & 0 & 7 \end{bmatrix}$$

2 Multiply row 2 of the augmented matrix by whatever factor is needed to solve for that row of the inverse matrix

$$\begin{bmatrix} 5 & 6 & 9 & | & 1 & 0 & 0 \\ 0 & 0.33 & 0 & | & 0 & 1 & 0 \\ 9 & 7 & 6 & | & 0 & 0 & 1 \end{bmatrix}$$

a
$$\begin{bmatrix} 5 & 6 & 9 & | & 1 & 0 & 0 \\ 0 & 0.11 & 0 & | & 0 & 2.25 & 0 \\ 9 & 7 & 6 & | & 0 & 0 & 1 \end{bmatrix}$$
b
$$\begin{bmatrix} 5 & 6 & 9 & | & 1 & 0 & 0 \\ 0 & 0.11 & 0 & | & 0 & 5.25 & 0 \\ 9 & 7 & 6 & | & 0 & 0 & 1 \end{bmatrix}$$
c
$$\begin{bmatrix} 5 & 6 & 9 & | & 1 & 0 & 0 \\ 0 & 0.11 & 0 & | & 0 & -2.25 & 0 \\ 9 & 7 & 6 & | & 0 & 0 & 1 \end{bmatrix}$$
d
$$\begin{bmatrix} 5 & 6 & 9 & | & 1 & 0 & 0 \\ 0 & 1 & 0 & | & 0 & 3 & 0 \\ 9 & 7 & 6 & | & 0 & 0 & 1 \end{bmatrix}$$
e
$$\begin{bmatrix} 5 & 6 & 9 & | & 1 & 0 & 0 \\ 0 & 0.11 & 0 & | & 0 & 3.75 & 0 \\ 9 & 7 & 6 & | & 0 & 0 & 1 \end{bmatrix}$$
f
$$\begin{bmatrix} 5 & 6 & 9 & | & 1 & 0 & 0 \\ 0 & 0.11 & 0 & | & 0 & 1.5 & 0 \\ 9 & 7 & 6 & | & 0 & 0 & 1 \end{bmatrix}$$

3 Swap rows 1 and 2 of the augmented matrix to solve those rows of the inverse matrix

$$\begin{bmatrix} 0 & 1 & 0 & | & 1 & 0 & 0 \\ 1 & 0 & 0 & | & 0 & 1 & 0 \\ 7 & 7 & 4 & | & 0 & 0 & 1 \end{bmatrix}$$

a
$$\begin{bmatrix} 1 & 0 & 0 & | & 0 & 1 & 0 \\ 0 & 1 & 0 & | & 1 & 0 & 0 \\ 7 & 7 & 4 & | & 0 & 0 & 1 \end{bmatrix}$$
b
$$\begin{bmatrix} 1 & 0 & 0 & | & 1 & 0 & 0 \\ 0 & 1 & 0 & | & 0 & 1 & 0 \\ 7 & 7 & 4 & | & 0 & 0 & 1 \end{bmatrix}$$
c
$$\begin{bmatrix} 1 & 0 & 0 & | & 0 & 1 & 0 \\ 0 & 1 & 0 & | & 1 & 0 & 0 \\ 7 & 7 & 4 & | & 0 & 0 & 1 \end{bmatrix}$$
d
$$\begin{bmatrix} 1 & 0 & 0 & | & 0 & 0 & 1 \\ 0 & 1 & 0 & | & 0 & 1 & 0 \\ 7 & 7 & 4 & | & 0 & 0 & 1 \end{bmatrix}$$
e
$$\begin{bmatrix} 1 & 0 & 0 & | & 0 & 1 & 0 \\ 0 & 1 & 0 & | & 0 & 1 & 0 \\ 7 & 7 & 4 & | & 0 & 0 & 1 \end{bmatrix}$$
f
$$\begin{bmatrix} 1 & 0 & 0 & | & 0 & 0 & 1 \\ 0 & 1 & 0 & | & 0 & 1 & 0 \\ 7 & 7 & 4 & | & 0 & 0 & 1 \end{bmatrix}$$

4 Divide row 3 of the augmented matrix by whatever factor is needed to solve for that row of the inverse matrix

$$\begin{bmatrix} 3 & 7 & 2 & | & 1 & 0 & 0 \\ 8 & 8 & 0 & | & 0 & 1 & 0 \\ 0 & 0 & 4 & | & 0 & 0 & 1 \end{bmatrix}$$

a
$$\begin{bmatrix} 3 & 7 & 2 & | & 1 & 0 & 0 \\ 8 & 8 & 0 & | & 0 & 1 & 0 \\ 0 & 0 & 16 & | & 0 & 0 & -6 \end{bmatrix}$$
b
$$\begin{bmatrix} 3 & 7 & 2 & | & 1 & 0 & 0 \\ 8 & 8 & 0 & | & 0 & 1 & 0 \\ 0 & 0 & 16 & | & 0 & 0 & 3 \end{bmatrix}$$
c
$$\begin{bmatrix} 3 & 7 & 2 & | & 1 & 0 & 0 \\ 8 & 8 & 0 & | & 0 & 1 & 0 \\ 0 & 0 & 1 & | & 0 & 0 & 0.25 \end{bmatrix}$$
d
$$\begin{bmatrix} 3 & 7 & 2 & | & 1 & 0 & 0 \\ 8 & 8 & 0 & | & 0 & 1 & 0 \\ 0 & 0 & 16 & | & 0 & 0 & 6 \end{bmatrix}$$
e
$$\begin{bmatrix} 3 & 7 & 2 & | & 1 & 0 & 0 \\ 8 & 8 & 0 & | & 0 & 1 & 0 \\ 0 & 0 & 16 & | & 0 & 0 & -3 \end{bmatrix}$$
f
$$\begin{bmatrix} 3 & 7 & 2 & | & 1 & 0 & 0 \\ 8 & 8 & 0 & | & 0 & 1 & 0 \\ 0 & 0 & 16 & | & 0 & 0 & -4 \end{bmatrix}$$

5 Add row 1 to row 2 of the augmented matrix as many times as needed to solve for row 2 of the inverse matrix

$$\begin{bmatrix} 4 & 0 & 0 & | & 1 & 0 & 0 \\ -8 & 1 & 0 & | & 0 & 1 & 0 \\ 1 & 7 & 1 & | & 0 & 0 & 1 \end{bmatrix}$$

a
$$\begin{bmatrix} 4 & 0 & 0 & | & 1 & 0 & 0 \\ 0 & 1 & 0 & | & -3 & 1 & 0 \\ 1 & 7 & 1 & | & 0 & 0 & 1 \end{bmatrix}$$
b
$$\begin{bmatrix} 4 & 0 & 0 & | & 1 & 0 & 0 \\ 0 & 1 & 0 & | & 1 & 1 & 0 \\ 1 & 7 & 1 & | & 0 & 0 & 1 \end{bmatrix}$$
c
$$\begin{bmatrix} 4 & 0 & 0 & | & 1 & 0 & 0 \\ 0 & 1 & 0 & | & -6 & 1 & 0 \\ 1 & 7 & 1 & | & 0 & 0 & 1 \end{bmatrix}$$
d
$$\begin{bmatrix} 4 & 0 & 0 & | & 1 & 0 & 0 \\ 0 & 1 & 0 & | & 6 & 1 & 0 \\ 1 & 7 & 1 & | & 0 & 0 & 1 \end{bmatrix}$$
e
$$\begin{bmatrix} 4 & 0 & 0 & | & 1 & 0 & 0 \\ 0 & 1 & 0 & | & 2 & 1 & 0 \\ 1 & 7 & 1 & | & 0 & 0 & 1 \end{bmatrix}$$
f
$$\begin{bmatrix} 4 & 0 & 0 & | & 1 & 0 & 0 \\ 0 & 1 & 0 & | & 4 & 1 & 0 \\ 1 & 7 & 1 & | & 0 & 0 & 1 \end{bmatrix}$$

6 Add row 3 to row 2 of the augmented matrix as many times as needed to solve for row 2 of the inverse matrix

$$\begin{bmatrix} 9 & 3 & 2 & | & 1 & 0 & 0 \\ 0 & 1 & -9 & | & 0 & 1 & 0 \\ 0 & 0 & 3 & | & 0 & 0 & 1 \end{bmatrix}$$

a
$$\begin{bmatrix} 9 & 3 & 2 & | & 1 & 0 & 0 \\ 0 & 1 & 0 & | & 0 & 1 & -6 \\ 0 & 0 & 3 & | & 0 & 0 & 1 \end{bmatrix}$$
b
$$\begin{bmatrix} 9 & 3 & 2 & | & 1 & 0 & 0 \\ 0 & 1 & 0 & | & 0 & 1 & 9 \\ 0 & 0 & 3 & | & 0 & 0 & 1 \end{bmatrix}$$
c
$$\begin{bmatrix} 9 & 3 & 2 & | & 1 & 0 & 0 \\ 0 & 1 & 0 & | & 0 & 1 & -3 \\ 0 & 0 & 3 & | & 0 & 0 & 1 \end{bmatrix}$$
d
$$\begin{bmatrix} 9 & 3 & 2 & | & 1 & 0 & 0 \\ 0 & 1 & 0 & | & 0 & 1 & -4.5 \\ 0 & 0 & 3 & | & 0 & 0 & 1 \end{bmatrix}$$
e
$$\begin{bmatrix} 9 & 3 & 2 & | & 1 & 0 & 0 \\ 0 & 1 & 0 & | & 0 & 1 & 10.5 \\ 0 & 0 & 3 & | & 0 & 0 & 1 \end{bmatrix}$$
f
$$\begin{bmatrix} 9 & 3 & 2 & | & 1 & 0 & 0 \\ 0 & 1 & 0 & | & 0 & 1 & 3 \\ 0 & 0 & 3 & | & 0 & 0 & 1 \end{bmatrix}$$

7 Swap rows 2 and 3 of the augmented matrix to solve those rows of the inverse matrix

$$\begin{bmatrix} 7 & 1 & 5 & | & 1 & 0 & 0 \\ 0 & 0 & 1 & | & 0 & 1 & 0 \\ 0 & 1 & 0 & | & 0 & 0 & 1 \end{bmatrix}$$

a
$$\begin{bmatrix} 7 & 1 & 5 & | & 1 & 0 & 0 \\ 0 & 1 & 0 & | & 0 & 0 & 1 \\ 0 & 0 & 1 & | & 0 & 1 & 0 \end{bmatrix}$$
b
$$\begin{bmatrix} 7 & 1 & 5 & | & 1 & 0 & 0 \\ 0 & 1 & 0 & | & 0 & 0 & 1 \\ 0 & 0 & 1 & | & 0 & 1 & 0 \end{bmatrix}$$
c
$$\begin{bmatrix} 7 & 1 & 5 & | & 1 & 0 & 0 \\ 0 & 1 & 0 & | & 0 & 0 & 1 \\ 0 & 0 & 1 & | & 0 & 0 & 0 \end{bmatrix}$$
d
$$\begin{bmatrix} 7 & 1 & 5 & | & 1 & 0 & 0 \\ 0 & 1 & 0 & | & 1 & 0 & 0 \\ 0 & 0 & 1 & | & 0 & 1 & 0 \end{bmatrix}$$
e
$$\begin{bmatrix} 7 & 1 & 5 & | & 1 & 0 & 0 \\ 0 & 1 & 0 & | & 0 & 1 & 0 \\ 0 & 0 & 1 & | & 1 & 0 & 0 \end{bmatrix}$$
f
$$\begin{bmatrix} 7 & 1 & 5 & | & 1 & 0 & 0 \\ 0 & 1 & 0 & | & 0 & 1 & 0 \\ 0 & 0 & 1 & | & 0 & 0 & 1 \end{bmatrix}$$