

Topic: Simple row operations**Question:** Write the new matrix after $R_1 \leftrightarrow R_2$.

$$\begin{bmatrix} 1 & -2 & 5 \\ 6 & 7 & 0 \\ 7 & 4 & 9 \end{bmatrix}$$

Answer choices:

A $\begin{bmatrix} 1 & -2 & 5 \\ 7 & 4 & 9 \\ 6 & 7 & 0 \end{bmatrix}$

B $\begin{bmatrix} 7 & 4 & 9 \\ 6 & 7 & 0 \\ 1 & -2 & 5 \end{bmatrix}$

C $\begin{bmatrix} 6 & 7 & 0 \\ 1 & -2 & 5 \\ 7 & 4 & 9 \end{bmatrix}$

D $\begin{bmatrix} 7 & 4 & 9 \\ 1 & -2 & 5 \\ 6 & 7 & 0 \end{bmatrix}$



Solution: C

The operation described by $R_1 \leftrightarrow R_2$ is switching row 1 with row 2. Nothing will happen to row 3. The matrix after $R_1 \leftrightarrow R_2$ is

$$\begin{bmatrix} 6 & 7 & 0 \\ 1 & -2 & 5 \\ 7 & 4 & 9 \end{bmatrix}$$



Topic: Simple row operations**Question:** Write the new matrix after $2R_2 \leftrightarrow 4R_3$.

$$\begin{bmatrix} 6 & 1 & 5 & -8 \\ -2 & 3 & 7 & 9 \\ 5 & -2 & 0 & 1 \end{bmatrix}$$

Answer choices:

A $\begin{bmatrix} 6 & 1 & 5 & -8 \\ 20 & -8 & 0 & 4 \\ -4 & 6 & 14 & 18 \end{bmatrix}$

B $\begin{bmatrix} 6 & 1 & 5 & -8 \\ -4 & 6 & 14 & 18 \\ 5 & -2 & 0 & 1 \end{bmatrix}$

C $\begin{bmatrix} 6 & 1 & 5 & -8 \\ -2 & 3 & 7 & 9 \\ 20 & -8 & 0 & 4 \end{bmatrix}$

D $\begin{bmatrix} 6 & 1 & 5 & -8 \\ -4 & 6 & 14 & 18 \\ 20 & -8 & 0 & 4 \end{bmatrix}$



Solution: A

The operation described by $2R_2 \leftrightarrow 4R_3$ is multiplying row 2 by a constant of 2, multiplying row 3 by a constant of 4, and then switching those two rows. Nothing will happen to row 1. The matrix after $2R_2$ is

$$\begin{bmatrix} 6 & 1 & 5 & -8 \\ -4 & 6 & 14 & 18 \\ 5 & -2 & 0 & 1 \end{bmatrix}$$

The matrix after $4R_3$ is

$$\begin{bmatrix} 6 & 1 & 5 & -8 \\ -4 & 6 & 14 & 18 \\ 20 & -8 & 0 & 4 \end{bmatrix}$$

The matrix after $2R_2 \leftrightarrow 4R_3$ is

$$\begin{bmatrix} 6 & 1 & 5 & -8 \\ 20 & -8 & 0 & 4 \\ -4 & 6 & 14 & 18 \end{bmatrix}$$



Topic: Simple row operations**Question:** Write the new matrix after $3R_1 + R_3 \rightarrow R_1$.

$$\begin{bmatrix} 7 & 8 & -2 & 0 \\ 5 & 1 & 6 & 13 \\ 4 & -7 & 3 & 9 \end{bmatrix}$$

Answer choices:

A $\begin{bmatrix} 21 & 24 & -6 & 0 \\ 5 & 1 & 6 & 13 \\ 4 & -7 & 3 & 9 \end{bmatrix}$

B $\begin{bmatrix} 7 & 8 & -2 & 0 \\ 5 & 1 & 6 & 13 \\ 25 & 17 & -3 & 9 \end{bmatrix}$

C $\begin{bmatrix} 7 & 8 & -2 & 0 \\ 25 & 17 & -3 & 9 \\ 4 & -7 & 3 & 9 \end{bmatrix}$

D $\begin{bmatrix} 25 & 17 & -3 & 9 \\ 5 & 1 & 6 & 13 \\ 4 & -7 & 3 & 9 \end{bmatrix}$



Solution: D

The operation described by $3R_1 + R_3 \rightarrow R_1$ is multiplying row 1 by a constant of 3, adding that resulting row to row 3, and using that result to replace row 1. The matrix after $3R_1$ is

$$\begin{bmatrix} 21 & 24 & -6 & 0 \\ 5 & 1 & 6 & 13 \\ 4 & -7 & 3 & 9 \end{bmatrix}$$

The sum $3R_1 + R_3$ is

$$[25 \quad 17 \quad -3 \quad 9]$$

The matrix after $3R_1 + R_3 \rightarrow R_1$, which is replacing row 1 with this row we just found, is

$$\begin{bmatrix} 25 & 17 & -3 & 9 \\ 5 & 1 & 6 & 13 \\ 4 & -7 & 3 & 9 \end{bmatrix}$$

