Topic: Cramer's rule for solving systems

Question: Which expression would give the value of y in the system?

$$3x - 2y = 21$$

$$-6x - 5y = 12$$

Answer choices:

A $\dfrac{\begin{vmatrix} 3 & -2 \\ -6 & -5 \end{vmatrix}}{\begin{vmatrix} 21 & -2 \\ 12 & -5 \end{vmatrix}}$

B $\dfrac{\begin{vmatrix} 3 & 21 \\ -6 & 12 \end{vmatrix}}{\begin{vmatrix} 3 & 6 \\ -2 & 1 \end{vmatrix}}$

C $\dfrac{\begin{vmatrix} 21 & -2 \\ 12 & -5 \end{vmatrix}}{\begin{vmatrix} 3 & -2 \\ -6 & -5 \end{vmatrix}}$

D $\dfrac{\begin{vmatrix} 3 & 21 \\ -6 & 12 \end{vmatrix}}{\begin{vmatrix} 3 & -2 \\ -6 & -5 \end{vmatrix}}$

Solution: D

Using the given system

$$3x - 2y = 21$$

$$-6x - 5y = 12$$

we can say

$$D = \begin{vmatrix} 3 & -2 \\ -6 & -5 \end{vmatrix}$$

and

$$D_y = \begin{vmatrix} 3 & 21 \\ -6 & 12 \end{vmatrix}$$

We can put those together to solve for the value of y.

$$y = \frac{D_y}{D} = \frac{\begin{vmatrix} 3 & 21 \\ -6 & 12 \end{vmatrix}}{\begin{vmatrix} 3 & -2 \\ -6 & -5 \end{vmatrix}}$$

Topic: Cramer's rule for solving systems

Question: Which expression would give the value of x in the system?

$$3x + 3y = 9$$

$$2x - y = -9$$

Answer choices:

A $$\frac{\begin{vmatrix} 3 & 9 \\ 2 & -9 \end{vmatrix}}{\begin{vmatrix} 3 & 3 \\ 2 & -1 \end{vmatrix}}$$

B $$\frac{\begin{vmatrix} 9 & 3 \\ -9 & -1 \end{vmatrix}}{\begin{vmatrix} 3 & 3 \\ 2 & -1 \end{vmatrix}}$$

C $$\frac{\begin{vmatrix} 3 & 3 \\ 2 & -1 \end{vmatrix}}{\begin{vmatrix} 9 & 3 \\ -9 & -1 \end{vmatrix}}$$

D $$\frac{\begin{vmatrix} 3 & 3 \\ 2 & -1 \end{vmatrix}}{\begin{vmatrix} 3 & 9 \\ 2 & -9 \end{vmatrix}}$$

Solution: B

Using the given system

$$3x + 3y = 9$$

$$2x - y = -9$$

we can say

$$D = \begin{vmatrix} 3 & 3 \\ 2 & -1 \end{vmatrix}$$

and

$$D_x = \begin{vmatrix} 9 & 3 \\ -9 & -1 \end{vmatrix}$$

We can put those together to solve for the value of x.

$$x = \frac{D_x}{D} = \frac{\begin{vmatrix} 9 & 3 \\ -9 & -1 \end{vmatrix}}{\begin{vmatrix} 3 & 3 \\ 2 & -1 \end{vmatrix}}$$

Topic: Cramer's rule for solving systems

Question: Which system would give this value?

$$\frac{D_x}{D} = \frac{\begin{vmatrix} 1 & -5 \\ 15 & 2 \end{vmatrix}}{\begin{vmatrix} 3 & -5 \\ 1 & 2 \end{vmatrix}}$$

Answer choices:

A $3x - 5y = 1$ and $x + 2y = 15$

B $x - 5y = 3$ and $15x - 2y = 1$

C $3x + y = -5$ and $x - 15y = 2$

D $x - 2y = 1$ and $3x + 15y = 2$

Solution: A

Let's find D for each answer choice and see which one(s) match the given expression.

For answer choice A we get

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

For answer choice B we get

$$D = \begin{vmatrix} 1 & -5 \\ 15 & -2 \end{vmatrix}$$

For answer choice C we get

$$D = \begin{vmatrix} 3 & 1 \\ 1 & -15 \end{vmatrix}$$

For answer choice D we get

$$D = \begin{vmatrix} 1 & -2 \\ 3 & 15 \end{vmatrix}$$

Only answer choice A matched the D in the given expression, so there's no need to check the D_x determinant; answer choice A must be the correct answer.