Topic: Linear systems in two unknowns

Question: Use substitution to find the unique solution to the linear system.

$$y = x + 7$$

$$x + 2y = -16$$

Answer choices:

A $(10,3)$

B $(-10,3)$

C $(10, -3)$

D $(-10, -3)$

Solution: D

Since the first equation is already solved for y, we'll make a substitution for y into the second equation, so that we can get the second equation in terms of only x.

$$x + 2y = -16$$

$$x + 2(x + 7) = -16$$

Solve this equation for x.

$$x + 2x + 14 = -16$$

$$3x + 14 = -16$$

$$3x = -30$$

$$x = -10$$

Now we'll take the value we found for x and plug it into the first equation to find the value of y.

$$y = x + 7$$

$$y = -10 + 7$$

$$y = -3$$

Putting these values together gives $(x, y) = (-10, -3)$.

Topic: Linear systems in two unknowns

Question: Use elimination to find the unique solution to the system of equations.

$$x - 3y = -7$$

$$2x - 3y = 4$$

Answer choices:

A $(12,7)$

B $(11,6)$

C $(9,3)$

D $(-11, -6)$

Solution: B

Since the y-term in each equation is $-3y$, we'll subtract the second equation from the first equation.

$$x - 3y - (2x - 3y) = -7 - (4)$$

$$x - 3y - 2x + 3y = -7 - 4$$

$$-x = -11$$

$$x = 11$$

Now that we have the value of x, we'll plug it into the original first equation and solve for y.

$$x - 3y = -7$$

$$11 - 3y = -7$$

$$11 - 11 - 3y = -7 - 11$$

$$-3y = -18$$

$$y = 6$$

To make sure that $(11,6)$ is the solution to the system, we'll plug it into the other original equation, the one we didn't use to find y.
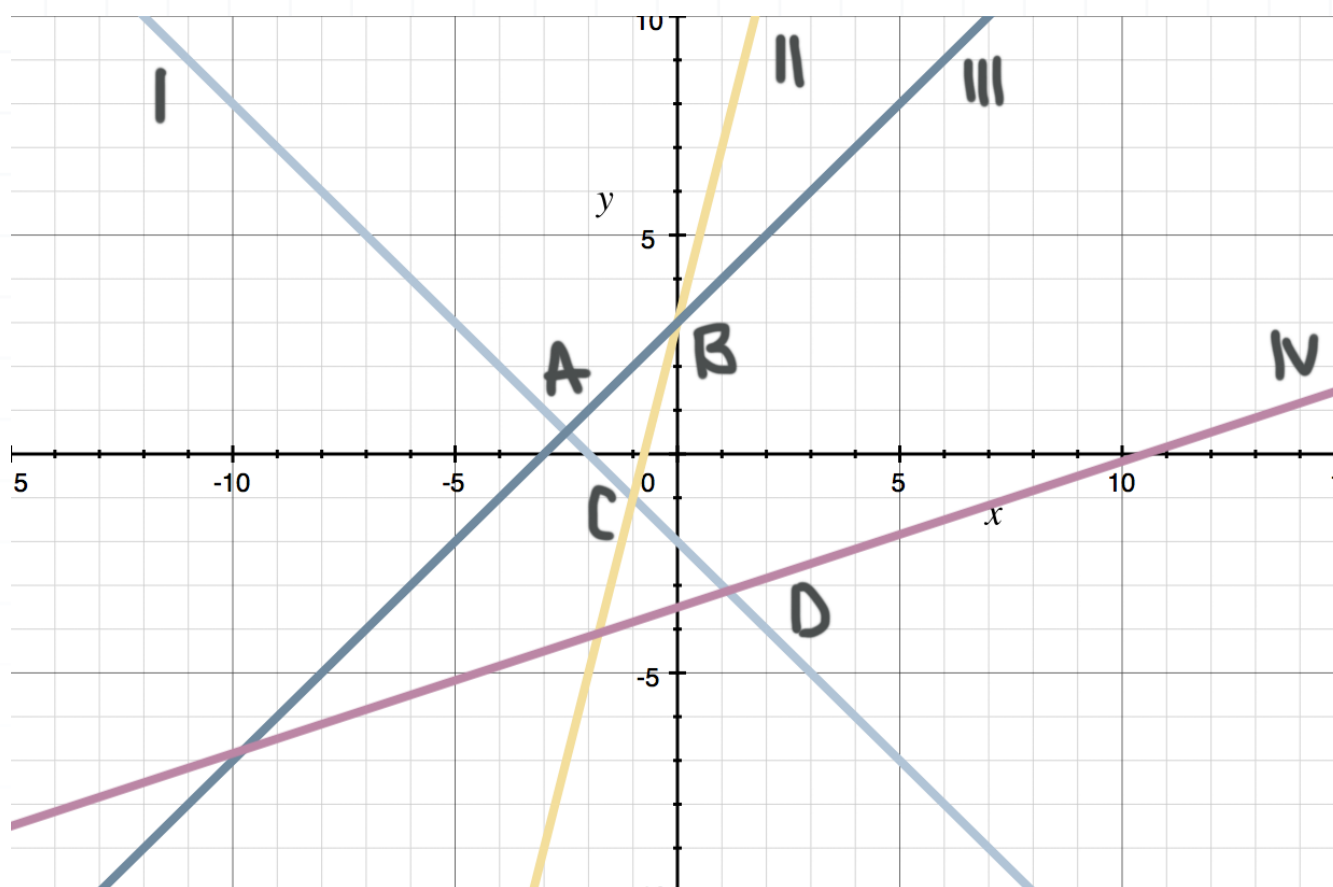
$$2x - 3y = 4$$

$$2(11) - 3(6) = 4$$

$$22 - 18 = 4$$

$$4 = 4$$

Since $4 = 4$ is true, we know $(11,6)$ is the solution to the system.

Topic: Linear systems in two unknowns

Question: Which labeled point in the graph would represent the solution to the system of equations $4x - y = -3$ and $x + y = -2$?

Answer choices:

A   Point A

B   Point B

C   Point C

D   Point D

Solution: C

One way to figure this out is to rewrite the two equations in slope-intercept form, and then see which two intersecting graphs belong to those equations. Rewriting $4x - y = -3$ gives

$$y = 4x + 3$$

This line has a slope of 4 and a y-intercept of 3. This is Graph **II**. Rewriting $x + y = -2$ gives

$$y = -x - 2$$

This line has a slope of -1 and a y-intercept of -2. This is Graph **I**.

Graphs **I** and **II** meet at point C, $(-1, -1)$.