Systems of Equations #4

Solve the system below using the method of SUBSTITUTION

\[2x - 3y = 5\]

\[3x + y = 2\]
Answer

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We will start by solving the second equation for \( y \): (That will be the easiest variable to solve for since the coefficient of \( y \) in the second equation is 1.)

\[
\begin{align*}
3x + y &= 2 \\
-3x &\quad -3x \\
y &= -3x + 2
\end{align*}
\]

(Now substitute this solution for \( y \) into the other equation.)

\[
\begin{align*}
2x - 3y &= 5 \\
2x - 3(-3x + 2) &= 5 \\
2x + 9x - 6 &= 5 \\
11x - 6 &= 5 \\
\frac{11x - 6}{6} &= \frac{5}{6} \\
11x &= 11
\end{align*}
\]

So, \( x = 1 \) (Now substitute this solution for \( x \) into either of the original equations.)

\[
\begin{align*}
3x + y &= 2 \\
3(1) + y &= 2 \\
3 + y &= 2
\end{align*}
\]

So, \( y = -1 \)

Summary: \( x = 1 \) and \( y = -1 \) or, in ordered pair notation \((1, -1)\) ← Answer

So, if we were to graph the two straight lines that form this 2 by 2 system, they would intersect at the point \((1, -1)\).