WS - Solving Systems by Substitution

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3:24 PM

① $y = 2x$
$x + y = 12$
$x + 2x = 12$
$3x = 12$
$\boxed{x = 4}$

$y = 2x$
$y = 2(4)$
$\boxed{y = 8}$

Solution: $(4, 8)$

② $x = 3y - 1$
$x + 2y = 9$
$(3y - 1) + 2y = 9$
$5y - 1 = 9$
$5y = 10$
$\boxed{y = 2}$

$x = 3y - 1$
$x = 3(2) - 1$
$x = 6 - 1$
$\boxed{x = 5}$

Solution: $(5, 2)$

③ $y = 2x - 5$
$4x - y = 7$
$4x - (2x - 5) = 7$
$4x - 2x + 5 = 7$
$2x = 2$
$\boxed{x = 1}$

$y = 2x - 5$
$y = 2(1) - 5$
$y = 2 - 5$
$\boxed{y = -3}$

Solution: $(1, -3)$

④ $2x - 3y = 12$
$x = 4y + 1$
$2(4y + 1) - 3y = 12$
$8y + 2 - 3y = 12$
$5y = 10$
$\boxed{y = 2}$

$x = 4y + 1$
$x = 4(2) + 1$
$x = 8 + 1$
$\boxed{x = 9}$

Solution: $(9, 2)$

⑤ $y = -x + 5$
$x - 4y = 10$
$x - 4(-x + 5) = 10$
$x + 4x - 20 = 10$
$5x = 30$
$\boxed{x = 6}$

$y = -x + 5$
$y = -6 + 5$
$\boxed{y = -1}$

Solution: $(6, -1)$

⑥ $x - y = 2 \rightarrow x = y + 2$
$4x - 3y = 11$
$4(y + 2) - 3y = 11$
$4y + 8 - 3y = 11$
$\boxed{y = 3}$

$x = y + 2$
$x = 3 + 2$
$\boxed{x = 5}$

Solution: $(5, 3)$

⑦ $-2x + 3y = 14$
$x + 2y = 7 \rightarrow x = -2y + 7$

$-2(-2y + 7) + 3y = 14$
$4y - 14 + 3y = 14$
$7y = 28$
$\boxed{y = 4}$

$x = -2y + 7$
$x = -2(4) + 7$
$x = -8 + 7$
$\boxed{x = -1}$

Solution $(-1, 4)$

⑧ $6x - y = -4 \rightarrow$ $\dfrac{-y}{-1} = \dfrac{-6x}{-1} - \dfrac{4}{-1}$
$2x + 2y = 15$ $\qquad y = 6x + 4$

$2x + 2(6x + 4) = 15$
$2x + 12x + 8 = 15$
$14x = 7$
$x = \dfrac{7}{14}$
$\boxed{x = \dfrac{1}{2}}$

$y = 6x + 4$
$y = 6\left(\dfrac{1}{2}\right) + 4$
$y = \dfrac{6}{2} + 4$
$y = 3 + 4$
$\boxed{y = 7}$

Solution $\left(\dfrac{1}{2}, 7\right)$

⑨ $x + y = 1 \rightarrow y = -x + 1$

⑩ $5x - 3y = -11$

⑨ $x+y=1 \longrightarrow y=-x+1$

$2x-y=-2$

$2x-(-x+1)=-2$ $y=-x+1$

$2x+x-1=-2$ $y=-(-\frac{1}{3})+1$

$3x=-1$ $y=\frac{1}{3}+\frac{3}{3}$

$\boxed{x=\frac{-1}{3}}$ $\boxed{y=\frac{4}{3}}$

Solution $\left(\frac{-1}{3},\frac{4}{3}\right)$

⑩ $5x-3y=-11$

$x-2y=2 \longrightarrow x=2y+2$

$5(2y+2)-3y=-11$ $x=2y+2$

$10y+10-3y=-11$ $x=2(-3)+2$

$7y=-21$ $x=-6+2$

$\boxed{y=-3}$ $\boxed{x=-4}$

Solution $(-4,-3)$

⑪ $x-y=3 \longrightarrow x=y+3$

$6x+4y=13$

$6(y+3)+4y=13$ $x=y+3$

$6y+18+4y=13$ $x=-\frac{1}{2}+3$

$10y=-5$ $x=-\frac{1}{2}+\frac{6}{2}$

$y=\frac{-5}{10}$ $\boxed{x=\frac{5}{2}}$

$\boxed{y=\frac{-1}{2}}$

Solution: $\left(\frac{5}{2},\frac{-1}{2}\right)$

⑫ $2x-y=16 \longrightarrow \dfrac{-y}{-1}=\dfrac{-2x}{-1}+\dfrac{16}{-1}$

$-x+2y=-8$

                $y=2x-16$

$-x+2(2x-16)=-8$

$-x+4x-32=-8$ $y=2x-16$

$3x=24$ $y=2(8)-16$

$\boxed{x=8}$ $y=16-16$

              $\boxed{y=0}$

Solution: $(8,0)$