Solving Systems of Equations by Substitution

1. $y = 3x$
   $x + y = 8$

① Solve for a single variable	② Substitute and Solve	③ Find other value and write solution
$y = 3x$ is already solved!	Plug $y = 3x$ in for y into the 2nd equation. $x + y = 8$ $1x + 3x = 8$ $\frac{4x}{4} = \frac{8}{4}$ $x = 2$	now plug $x = 2$ back into one of my equations $y = 3x$ $y = 3(2)$ $y = 6$ Solution: $(2, 6)$

2. $2x + y = 9$
   $x + 4y = 1$

① Solve for a single variable	② Substitute and Solve	③ Find other value and write solution
Use 1st equation & solve for y: $2x + y = 9$ $-2x \quad -2x$ $y = 9 - 2x$	plug $y = 9 - 2x$ into 2nd equation: $x + 4y = 1$ $x + 4(9 - 2x) = 1$ $1x + 36 - 8x = 1$ $-7x + 36 = 1$ $-36 \quad -36$ $\frac{-7x}{-7} = \frac{-35}{-7}$ $x = 5$	now plug $x = 5$ back into an equation: $x + 4y = 1$ $5 + 4y = 1$ $-5 \quad -5$ $\frac{4y}{4} = \frac{-4}{4}$ $y = -1$ Solution: $(5, -1)$

3. $2a - b = 1$
$5a - 3b = 0$ (a, b)

① Solve for a single variable →	② Substitute and Solve →	③ Find other value and write solution
Use 1st equation: $2a - b = 1$ $-2a \quad -2a$ $-b = 1 - 2a$ $\frac{-b}{-1} = \frac{1}{-1} - \frac{2a}{-1}$ $b = -1 + 2a$ $b = 2a - 1$	plug into 2nd equation: $5a - 3b = 0$ $5a - 3(-1 + 2a) = 0$ $5a + 3 - 6a = 0$ $-a + 3 = 0$ $-3 \quad -3$ $\frac{-a}{-1} = \frac{-3}{-1}$ $a = 3$	plug $a = 3$ into an equation: $2a - b = 1$ $2(3) - b = 1$ $6 - b = 1$ $-6 \quad -6$ $\frac{-b}{-1} = \frac{-5}{-1}$ $b = 5$

Solution: $(3, 5)$