R1 $2x+y=1$ $\qquad aR_1+bR_2$

R2 $x-y=5$

$(2,-3)$

$$a(2x+y)+b(x-y)=a+5b$$

$$2ax+ay+bx-by=a+5b$$

$$2ax+bx+ay-by=a+5b$$

$$\underline{x}(\underbrace{2a+b}_{R_1})+\underline{y}(\underbrace{a-b}_{R_2})=\underset{R_1}{\overline{a}}+\underset{R_2}{\overline{5b}}$$

$$x\left(2+\frac{3b}{a-b}\right)(a-b)+y(a-b)=a+5b$$

$$(a-b)\left[x\left(2+\frac{3b}{a-b}\right)+y\right]=a+5b$$

$$x\left(2+\frac{3b}{a-b}\right)+y=\frac{a+5b}{a-b}$$

$a\neq b$ $\quad y=-\left(2+\frac{3b}{a-b}\right)x+\frac{a+5b}{a-b}$

$$m = -\left(2 + \frac{3b}{a-b}\right)$$

$$-m = 2 + \frac{3b}{a-b}$$

(Ashlee says this is easier to simplify w/ a common denominator)

$$-m - 2 = \frac{3b}{a-b}$$

"let $a = 1$"

$$-m - 2 = \frac{3b}{1-b}$$

$$(-m-2)(1-b) = 3b$$

$$-2 + 2b - m + mb = 3b$$

$$-2 - m = 3b - 2b - mb$$

$$-2 - m = b(1-m)$$

$$\frac{-2-m}{1-m} = b$$

*This is only all solutions where $a=1$. This does not work where $m=1$. See below to find $m=1$.

If $a=0$, $m = -\left(2 + \frac{3b}{-b}\right) = -(2-3) = 1$

so every line possible will go through our solution