Review of 8.1 and 8.2

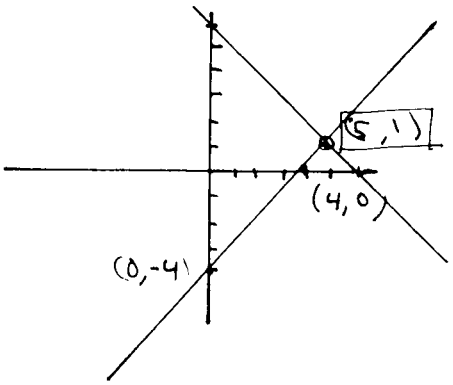
Methods for solving systems of equations:

1. By graphing
2. By substitution
3. By elimination
4. Using matrices and Gaussian elimination.
5. Cramer's Rule.

ex: ① $x - y = 4 \rightarrow y = x - 4$

② $x + y = 6$

① For what (x, y) is $x - y = 4$? $(5,1)$, $(6,2)$, $(4,0)$, $(8,4)$, ...



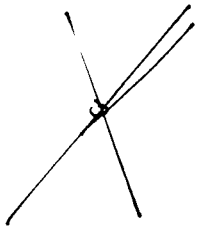
② For what (x, y) is $x + y = 6$

$(0,6)$, $(6,0)$, $(5,1)$, ...

The only ordered pair which satisfies BOTH equations is

$(x, y) = (5, 1)$

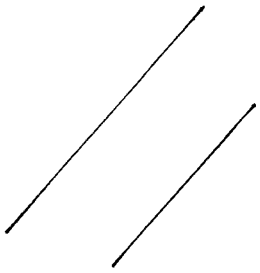
What can happen?



Intersecting lines

One solution

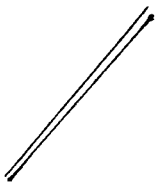
Consistent, independent



Parallel lines

No solution

Inconsistent

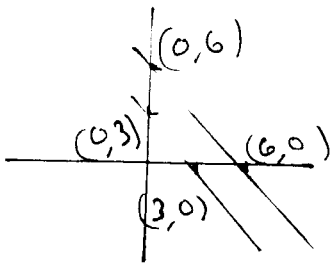


Coinciding lines

Infinitely many solutions

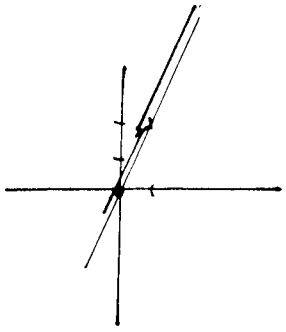
Consistent, dependent

ex: $\begin{cases} x+y=6 \\ x+y=3 \end{cases}$



Inconsistent

ex: $\begin{cases} y=2x \\ 0=20x-10y \end{cases}$



Substitution

ex: $\begin{cases} x+2y=4 \\ 2x+3y=1 \end{cases}$ $\rightarrow$ $x=-2y+4$ Sub into 2nd:

$2(-2y+4)+3y=1$

$-4y+8+3y=1$

$-y+8=1$

$-y=-7$

$y=7$

$x=-2(7)+4$

$=-14+4$

$=-10$

$\boxed{(x,y)=(-10,7)}$

Elimination

ex: ① $2x - 3y = 8$

② $6x + 5y = 4$

$-3 \cdot$ ①: $-6x + 9y = -24$

②: $6x + 5y = 4$

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③ $14y = -20$

$7y = -10 \Rightarrow y = -\frac{10}{7}$

Now Back-substitute: In ①

$2x - 3\left(-\frac{10}{7}\right) = 8$ Multiply by 7:

$14x + 30 = 56$

$-30 \quad -30$

$14x = 26$

$7x = 13$

$x = \frac{13}{7}$

$(x, y) = \left(\frac{13}{7}, \frac{-10}{7}\right)$