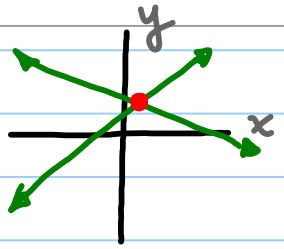
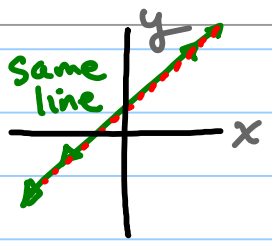
3/28 THU

7.1 & 7.2 Solving Systems of Equations (Linear) (Two/Three Variables)



one solution

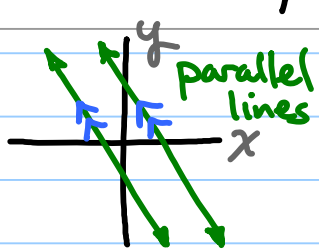
- consistent
- independent



∞ solutions

- Consistent
- dependent

0 = 0 TRUE ∴ ∞ solns



no solutions, ∅

- inconsistent

0 = 5 FALSE ∴ no solns

Substitution

- isolate a variable & substitute into the other equation....

ex 1) $5x - 4y = 9$

Substitution → $x = 2y - 3$ (already isolated)

$5(2y-3) - 4y = 9$

$10y - 15 - 4y = 9$

$6y = 24$

$y = 4$

$x = 2(4) - 3$

$x = 5$

∴ (5, 4) : consistent & independent

Elimination

- line up $Ax + By = C$
- Add / Subt multiples of one equation to another
- "Add opposites / Subt sames" : positive / negative

ex 2) Elimination

$3x + 2y = 48$

$9x - 8y = -24$

opposites

need LCM

2 & -8 → "8"

$(3x + 2y = 48) \cdot 4 \rightarrow 12x + 8y = 192$

$9x - 8y = -24$

$(+)$

$21x = 168$

$\frac{21x}{21} = \frac{168}{21}$

$x = 8$

$3(8) + 2y = 48$

$24 + 2y = 48$

$2y = 24$

$y = 12$

∴ (8, 12) → consistent & independent

ex 3) $6x+2y=7$, $y=2-3x$

Elim or Subst? Subst

$6x+2(2-3x)=7$

$6x+4-6x=7$

$4=7$

false — lines ∥

∴ no solution, inconsistent

ex 4) $3x-y=5$ $\cdot 7$

$21x-7y=35$

Elim — LCM 21

$21x-7y=35$

$(-)\ 21x-7y=35$

$0=0$

True

∴ ∞ solutions, same line, consistent, dependent

ex 5) ① $2x+y-2z=-1$

② $3x-3y-z=5$

③ $x-2y+3z=6$

②&③ $(3x-3y-z=5)\cdot 3$

$x-2y+3z=6$

$9x-9y-3z=15$

$(+)\ x-2y+3z=6$

⑤ $10x-11y=21$

? • eliminate a variable: z

①&② $2x+y-2z=-1$ LCM 2

$(3x-3y-z=5)\cdot -2$

$2x+y-2z=-1$

$(+)\ -6x+6y+2z=-10$

④ $-4x+7y=-11$

$(-4x+7y=-11)\cdot 5$ LCM 20

$(10x-11y=21)\cdot 2$

$-20x+35y=-55$

$(+)\ 20x-22y=42$

$13y=-13$

$y=-1$

$-4x+7(-1)=-11$

$-4x-7=-11$

$-4x=-4$

$x=1$

Use #3 to solve z:

$(1)-2(-1)+3z=6$

$1+2+3z=6$

$3z=3$ ... $z=1$

∴ $(1,-1,1)$