8.2 Solving Systems of Equations Algebraically

ex) Solve $\begin{cases} y = x+6 \\ y = x^2 \end{cases}$ using elimination & subst.

ELIM

$y = x+6$

$-(y = x^2)$

$0 = x+6-x^2$

$x^2 - x - 6 = 0$

$(x-3)(x+2) = 0$

$x = 3 \quad x = -2$

$(3, 9)$

$(-2, 4)$

$y = 3+6 = 9$

$y = (3)^2 = 9$

$y = -2+6 = 4$

$y = (-2)^2 = 4$

SUB

$x+6 = x^2$

$0 = x^2 - x - 6$

The rest is the same as elimination...

ex) Solve $\begin{cases} y = 2x^2 + 3x - 3 \\ y = x^2 + x \end{cases}$ using elim & sub.

Elim

$y = 2x^2 + 3x - 3$

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

$0 = x^2 + 2x - 3$

$0 = (x+3)(x-1)$

$x = -3 \quad x = 1$

$(-3, 6)$

$(1, 2)$

Sub

$2x^2 + 3x - 3 = x^2 + x$

$-x^2 \quad -x \qquad -x^2 \quad -x$

$x^2 + 2x - 3 = 0$

etc...

ex) Solve $\begin{cases} 3x+y=-9 \\ 4x^2-x+y=-9 \end{cases}$ using both algebraic methods.

ELIM

$4x^2-x+y=-9$

$-(3x+y=-9)$

$4x^2-4x=0$

$4x(x-1)=0$

$4x=0 \quad x-1=0$

$x=0 \quad x=1$

$(0,-9)$

$(1,-12)$

SUB

① $3x+y=-9$

$y=-9-3x$

② $4x^2-x+(-9-3x)=-9$

$4x^2-x-9-3x+9=0$

$4x^2-4x=0$

etc...

ex) Solve $\begin{cases} 6x^2 - x - y = -1 \\ 4x^2 - 4x - y = -6 \end{cases}$ using elim. or sub.

Elim

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#3-5 (choose some)

#6, 8

$2x^2 + 3x = 5$

$2x^2 + 3x - 5 = 0$ x: -10 +: +3

$2x^2 - 2x + 5x - 5 = 0$

$2x(x-1) + 5(x-1) = 0$

$(x-1)(2x+5) = 0$

$x = 1$ $x = -5/2$

$(1, 6)$

$(-5/2, 41)$