

7.4 (part 2) Solving Nonlinear Equations (2 variables: Elimination)

ex 1) $\begin{cases} x^2 + y^2 = 196 \\ x^2 - y^2 = 196 \end{cases}$ (hyperbola)

(+) $\begin{array}{r} x^2 + y^2 = 196 \\ x^2 - y^2 = 196 \\ \hline 2x^2 = 392 \\ x^2 = 196 \\ x = \pm 14 \end{array}$

(-) $\begin{array}{r} x^2 + y^2 = 196 \\ x^2 - y^2 = 196 \\ \hline 2y^2 = 0 \\ y^2 = 0 \\ y = \pm\sqrt{0} = 0 \end{array}$ (also for $(-14)^2 + \dots$)

$\rightarrow (14, 0) \text{ \& } (-14, 0)$

ex 2) $\begin{cases} 5x^2 - 5y^2 = -35 \\ 2x^2 + 2y^2 = 50 \end{cases}$

$\xrightarrow{\text{LCD } 10}$ $\begin{cases} 10x^2 - 10y^2 = -70 \\ 10x^2 + 10y^2 = 250 \end{cases}$

(+) $\begin{array}{r} 10x^2 - 10y^2 = -70 \\ 10x^2 + 10y^2 = 250 \\ \hline 20x^2 = 180 \\ x^2 = 9 \rightarrow x = \pm 3 \end{array}$

$2(3)^2 + 2y^2 = 50$
 $18 + 2y^2 = 50$
 $2y^2 = 32$
 $y^2 = 16$
 $y = \pm 4$

also for $2(-3)^2 + \dots$

$\rightarrow (3, 4), (3, -4), (-3, 4), (-3, -4)$

ex 3) $\begin{cases} x^2 - y^2 = 37 \\ x^2 + y^2 = 43 \end{cases}$

(+) $\begin{array}{r} x^2 - y^2 = 37 \\ x^2 + y^2 = 43 \\ \hline 2x^2 = 80 \\ x^2 = 40 \\ x = \pm\sqrt{40} = \pm 2\sqrt{10} \end{array}$

$(2\sqrt{10})^2 + y^2 = 43$
 $40 + y^2 = 43$
 $y^2 = 3$
 $y = \pm\sqrt{3}$

$\rightarrow (2\sqrt{10}, \sqrt{3}), (2\sqrt{10}, -\sqrt{3}), (-2\sqrt{10}, \sqrt{3}), (-2\sqrt{10}, -\sqrt{3})$

ex 4) $\begin{cases} x^2 + y^2 - 2x - 8y + 13 = 0 \\ x^2 - y^2 - 2x + 8y - 19 = 0 \end{cases}$

(+) $\begin{array}{r} x^2 + y^2 - 2x - 8y + 13 = 0 \\ x^2 - y^2 - 2x + 8y - 19 = 0 \\ \hline 2x^2 - 4x - 6 = 0 \\ x^2 - 2x - 3 = 0 \\ (x-3)(x+1) = 0 \\ x = 3 \mid x = -1 \end{array}$

$3^2 + y^2 - 2(3) - 8y + 13 = 0$
 $y^2 - 8y + 16 = 0$
 $(y-4)(y-4) = 0$
 $y = 4 \rightarrow (3, 4)$

$(-1)^2 + y^2 - 2(-1) - 8y + 13 = 0$
 $y^2 - 8y + 16 = 0$
 $y = 4 \rightarrow (-1, 4)$

Hw
 p 775
 #20-42
 even
 $\sqrt{\cdot}$: 24, 26, 28, 30 fract: 26, 34