5.4 Solving Systems of non-linear equations.

Solve.

ex. 1

① $x^2 - 2y = 1$

② $x^2 + 5y = 29$

sub into ① or ②

① − ②

$x^2 - 2y = 1$

$-x^2 - 5y = -29$

$-7y = -28$

$y = +4$

y

$x^2 - 2(4) = 1$

$x^2 - 8 = 1$

$x^2 = 9$

$x = \pm\sqrt{9}$

$= \pm 3$

$(3, 4), (-3, 4)$

There are two Solutions

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ex. 2 #24

① $xy = 24 \rightarrow y = \frac{24}{x}$

② $2x^2 - y^2 + 4 = 0$

Sub into "②"

$2x^2 - \left(\frac{24}{x}\right)^2 + 4 = 0$

$2x^2 - \left(\frac{24}{x}\right)^2 = -4$

multiply by x^2

$2x^2 - \frac{576}{x^2} = -4$

$2x^4 - 576 = -4x^2$

$2x^4 + 4x^2 - 576 = 0$

$x^4 + 2x^2 - 288 = 0$

$(x^2 + 18)(x^2 - 16) = 0$

Z.P.P.

$x^2 + 18 = 0$

$\sqrt{x^2} = \sqrt{-18}$

not a real number

$x^2 - 16 = 0$

$x^2 = 16$

$x = \pm\sqrt{16}$

$= \pm 4$

$y = \frac{24}{4}$ ← x

$y = 6$

$y = \frac{24}{-4}$ ← x

$= -6$ ← y

$(4, 6), (-4, -6)$

5.4 Systems of nonlinear equations

ex. 1

Solve the system.

$$x^2 + y^2 = 8$$
$$x + y = 0$$

$y = -x$

Sub into other equation

$$x^2 + (-x)^2 = 8$$
$$x^2 + x^2 = 8$$
$$\frac{2x^2}{2} = \frac{8}{2}$$
$$\sqrt{x^2} = \pm\sqrt{4}$$
$$x = \pm 2$$

y_1 y_2

$(2, -2), (-2, 2)$

ex. 2

$y = 4 - x^2$

$y = x^2 - 4$

set "="

$4 - x^2 = x^2 - 4$

$+4 + x^2 \quad +x^2 + 4$

$\frac{8}{2} = \frac{2x^2}{2}$

$\pm\sqrt{4} = \sqrt{x^2}$

$\pm 2 = x$

$(2, 0), (-2, 0)$

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ex. 3

$x^2 y = 16$

$x^2 + 4y + 16 = 0$

$x^2 = -4y - 16$

now, sub.

$(-4y - 16)y = 16$

$-4y^2 - 16y = 16$

$+4y^2 + 16y \quad +4y^2 + 16y$

$0 = 4y^2 + 16y + 16$

÷ by 4

$0 = y^2 + 4y + 4$ (factor)

$0 = (y+2)(y+2)$

Z.P.P.

$y + 2 = 0$

$y = -2$

when $y = -2$ $x = ?$

$x^2 = -4(-2) - 16$

$x^2 = +8 - 16$

$\sqrt{x^2} = \sqrt{-8}$

not a Real #

so, no solution