

MTH 112

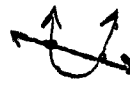
TUESDAY 10-16-12

CLASS NOTES

Ch. 12-4 Systems of Non-Linear Equations

EX 12-4A
Pg 542-3

$$\begin{cases} y = x^2 - 2x + 1 \\ x + y = 3 \end{cases}$$

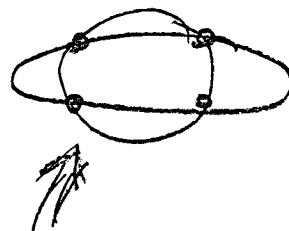
USE EBS
+ Graph 

WHAT ARE
LINEAR-QUADRATIC
OPTIONS?

EX 12-4B
Pg 543

$$\begin{cases} x^2 + y^2 = 25 \\ x^2 + 4y^2 = 52 \end{cases}$$

USE EBA
+ Graph



WHAT ARE
QUADRATIC-QUADRATIC
OPTIONS.

$\{\pm 4, \pm 3\}$

Ex 12-4A
pg 542-3

$$\begin{cases} y = x^2 - 2x + 1 \\ x + y = 3 \Rightarrow y = 3 - x \end{cases}$$

$$\begin{array}{rcl} 3 - x & = & x^2 - 2x + 1 \\ -3 + x & & + x - 3 \end{array}$$

$$0 = x^2 - x - 2$$

$$\text{sum} = -1$$

$$\text{prod} = -2$$

$$\begin{array}{c} 1 \quad -2 \\ +1 \quad -2 \end{array}$$

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

$$x = -1, 2$$

$$x = -1$$

$$x + y = 3$$

$$-1 + y = 3$$

$$y = 4$$

$$(-1, 4)$$

$$x = 2$$

$$x + y = 3$$

$$2 + y = 3$$

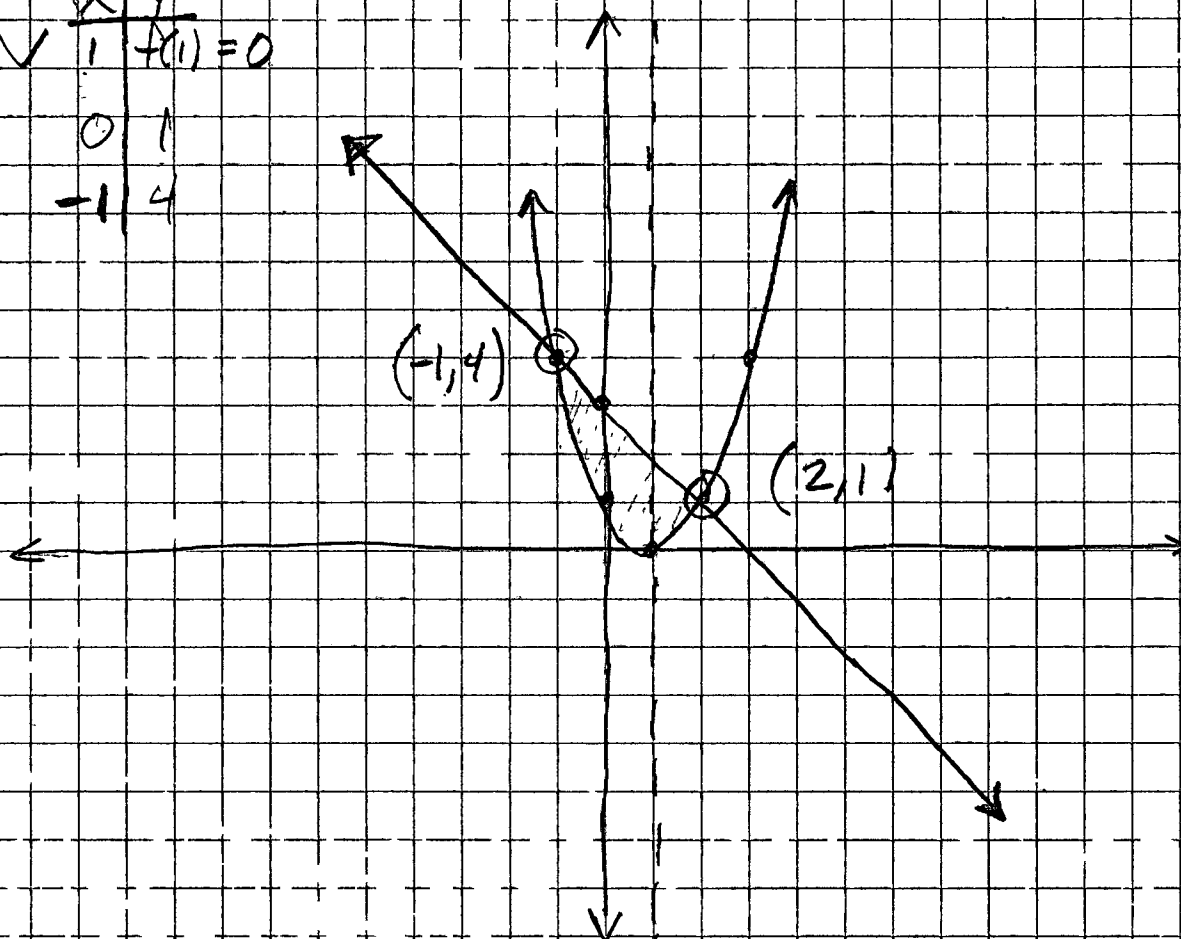
$$y = 1$$

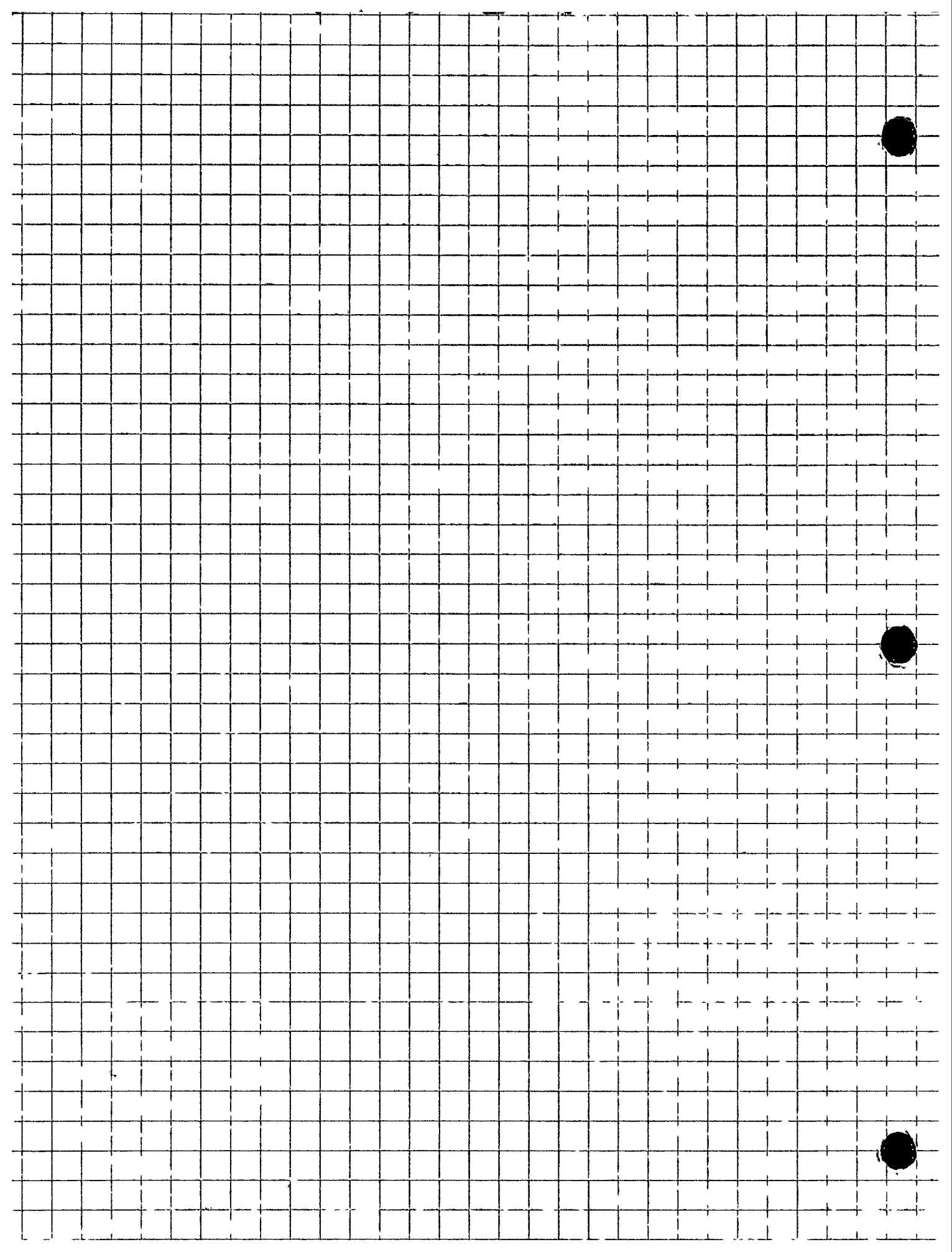
$$(2, 1)$$

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

$$x = -\frac{b}{2a} = \frac{2}{2} = 1$$

$$y = -x + 3$$

$$\checkmark \begin{array}{c|c} x & y \\ \hline 1 & f(1) = 0 \\ 0 & 1 \\ -1 & 4 \end{array}$$




9
P8545

$$\begin{cases} x^2 - y^2 = 15 \\ xy = 4 \end{cases} \Rightarrow y = \frac{4}{x} \quad \text{SUBSTITUTE}$$

$$x^2 - \left(\frac{4}{x}\right)^2 = 15$$

$$x^2 - \frac{16}{x^2} = 15 \quad \text{Mult. by } x^2$$

$$x^4 - 16 = 15x^2$$

$$x^4 - 15x^2 - 16 = 0 \quad \text{Let } u = x^2$$

$$u^2 - 15u - 16 = 0$$

$$\begin{aligned} \text{sum} &= -15 \\ \text{prod} &= -16 \\ &\quad +1 \quad -16 \end{aligned}$$

$$(u+1)(u-16) = 0$$

$$u = -1, u = 16$$

$$u = -1$$

$$x^2 = -1$$

$$x = \pm \sqrt{-1}$$

$$\boxed{x = \pm i}$$

$$xy = 4$$

$$i y = 4$$

$$y = \frac{4}{i} \cdot \frac{i}{i} = -4i$$

$$-iy = 4$$

$$y = \frac{4}{-i} \cdot \frac{i}{i} = 4i$$

$$\{(i, -4i), (-i, 4i)\}$$

$$u = 16$$

$$x^2 = 16$$

$$\boxed{x = \pm 4}$$

$$xy = 4$$

$$y = 1$$

$$-4y = 4$$

$$y = -1$$

$$\{(4, 1), (-4, -1)\}$$



WolframAlpha™ computational knowledge engine

Plot $x^2 - y^2 = 15$, $xy = 4$, $x=0$, $y=0$, $(-50 < x < 50)$, $(-50 < y < 50)$

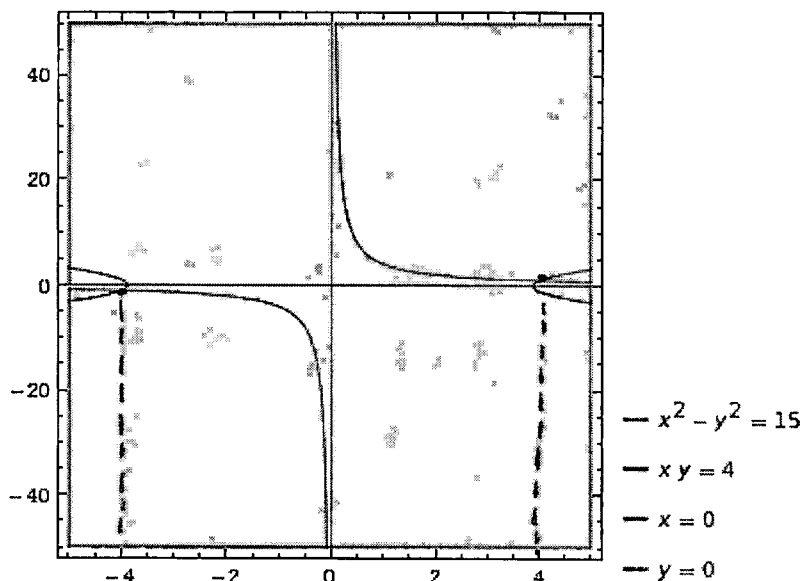


Examples Random

Input interpretation:

	$x^2 - y^2 = 15$	
	$xy = 4$	
plot	$x = 0$	$y = -50 \text{ to } 50$
	$y = 0$	
	$-50 < x < 50$	

Implicit plot:



Pg. 545 #9

NOTE: parent function of $xy = 4$ or $y = \frac{4}{x}$
is $y = \frac{1}{x} \Rightarrow$ hyperbola

