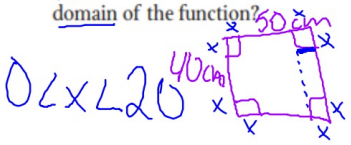
Math 3
Take out homework
Warm -Up

Use the following information to complete problems 1–3.

1. Felix has a rectangular sheet of aluminum that measures 40 cm × 50 cm. He wants to create a box with no top by cutting congruent squares out of the corners and folding up the sides. What function does Felix have to maximize to create the box with the largest volume? What is the domain of the function?



$0 < x < 20$

$V = l \cdot w \cdot h$

$V = (50-2x)(40-2x)x$

2. What size squares does Felix have to cut from the corners of the aluminum to maximize the volume of the box?

$7.36\text{cm} \times 7.36\text{cm}$

3. What is the volume of the box?

6564.23cm^3

A **Systems of equation** is

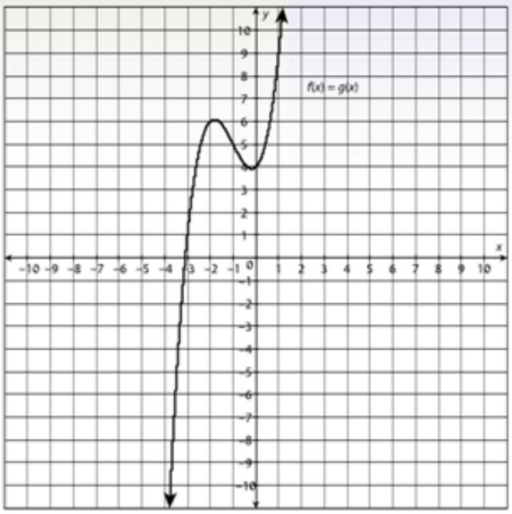
Set or collection of equations that we deal with together at the same time.

The point of intersection

places where two or more functions cross.

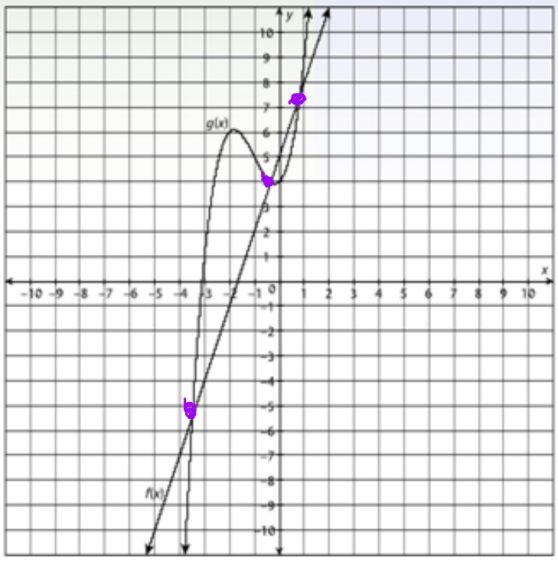
Independent System	A system with a finite number of points of intersection.
Empty Set	System with no intersection points
Dependent System	When a system intersects at every point

Solutions to Systems of Equations with Polynomials



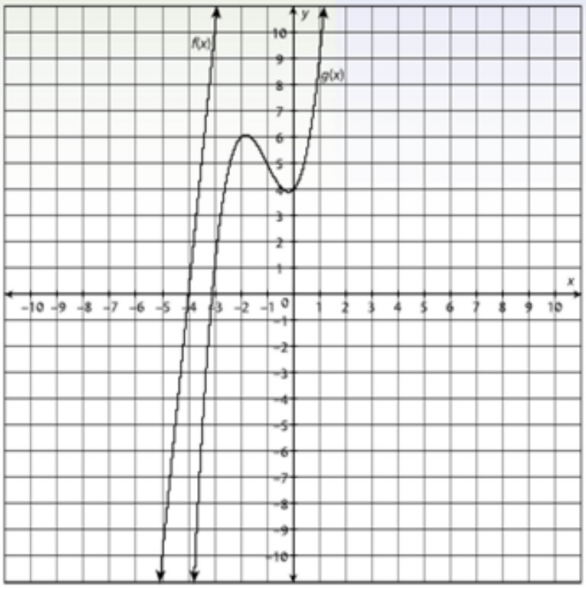
- If the equations overlap, they have an infinite number of solutions.
- This is an example of a dependent system.

Solutions to Systems of Equations with Polynomials

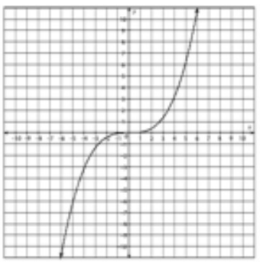
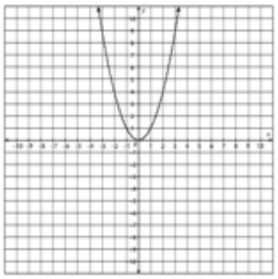


- If the equations intersect, they have a finite number of solutions.
- This is an example of an independent system.

Solutions to Systems of Equations with Polynomials



- If the equations do not intersect, they have no solutions.
- The solution to this system is the empty set.

TYPE OF EQUATIONS	GENERAL EQUATION	GRAPH
Cubic	ax^3+bx^2+cx+d or $y=a(x-h)^3+k$	
quadratic	ax^2+bx+c or $y=a(x-h)^2+k$	

Example 2

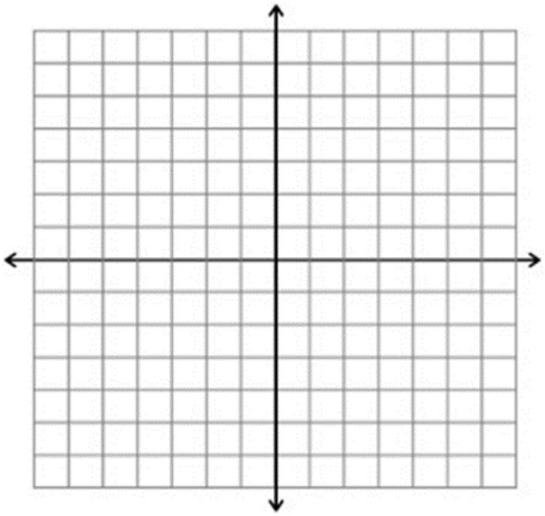
Use a graph to estimate the real solution(s), if any, to the system of equations. Verify that any identified coordinate pairs are solutions.

$$\begin{cases} f(x) = 4x + 1 \\ g(x) = x^3 + 1 \end{cases}$$

$(-2, -7)$

$(0, 1)$

$(2, 9)$



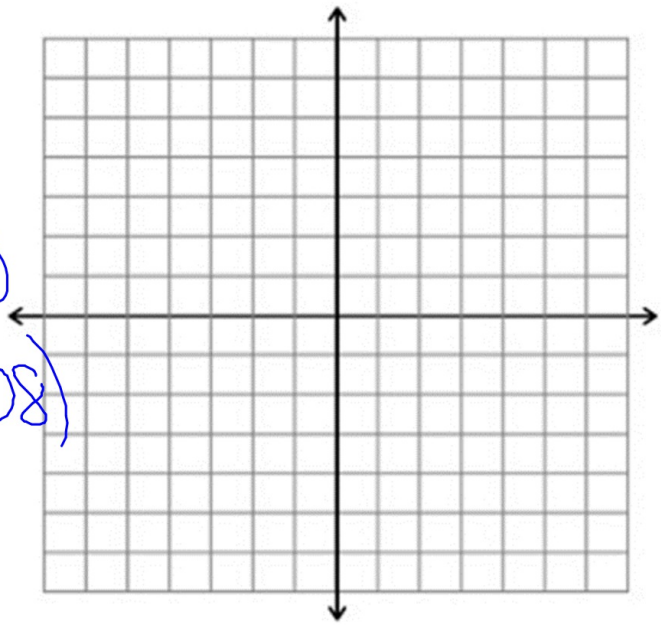
Example 3

Create a table to approximate the real solution(s), if any, to the system

$$\begin{cases} f(x) = |x + 4| + 1 \\ g(x) = x^4 + 3x^3 + 1 \end{cases}$$

$(-3.03, 1.97)$

$(1.08, 6.08)$



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

$x)=\frac{1}{2}x^3-2x-1$ $(-3.04, -8.96)$

$(x)=3x^4-2x-1$

$x)=2x-5$ empty set

$(x)=-2x^3+3x^2+x+4$

$x)=3^x-7$ $(2, 2)$

$(x)=x^5-4x^3+6$ $(-2.08, 2.87)$

$x)=\frac{3}{2}x+6$ $(0, 6)$ $(2.08, 9.13)$

contin

For problems 8–10, each table shows values for two functions in a system of equations. Based on the table, what conclusions can you draw about the number of solutions and the x-values of any solutions?

8.

x	–4	–3	–2	–1	0	1	2	3	4	5
$f(x)$	–60	–20	0	6	4	0	0	10	36	84
$g(x)$	–45	0	21	24	15	0	–15	–24	–21	0

9.

x	–3	–2	–1	0	1	2	3	4	5
$f(x)$	9	7	5	5	7	9	11	13	15
$g(x)$	–13	11	11	–1	–13	–13	11	71	179