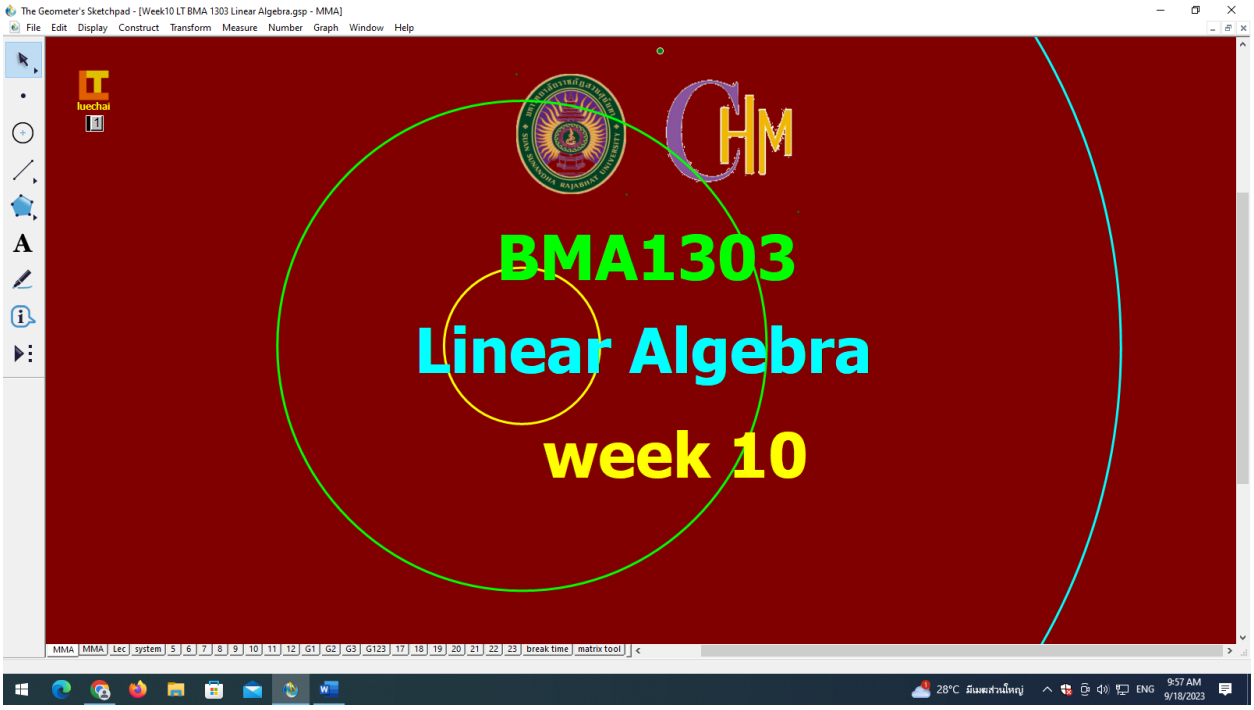
The Geometer's Sketchpad - [Week10 LT BMA 1303 Linear Algebra.gsp - MMA]
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BMA1303
Linear Algebra
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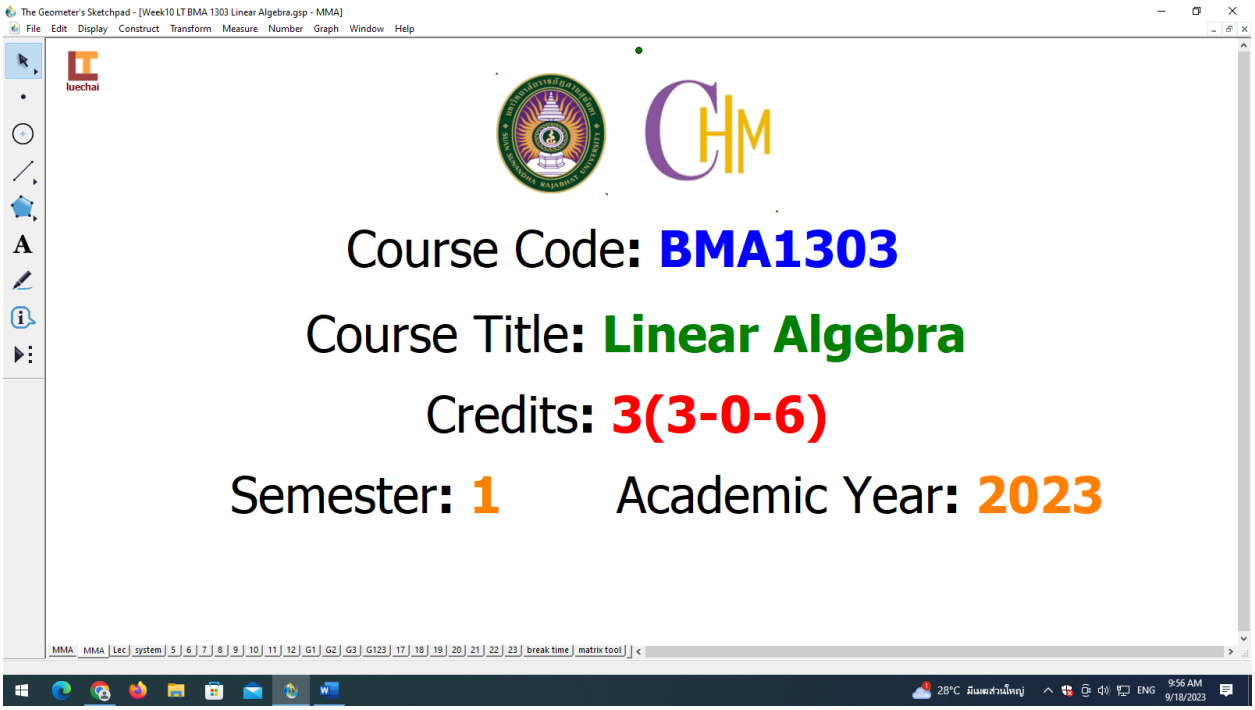
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Course Code: BMA1303
Course Title: Linear Algebra
Credits: 3(3-0-6)
Semester: 1 Academic Year: 2023
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The Geometer's Sketchpad - [Week10 LT BMA 1303 Linear Algebra.gsp - Lec]
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Lecturer responsible for this course:
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MMA MMA Lec system 5 6 7 8 9 10 11 12 G1 G2 G3 G123 17 18 19 20 21 22 23 break time matrix tool
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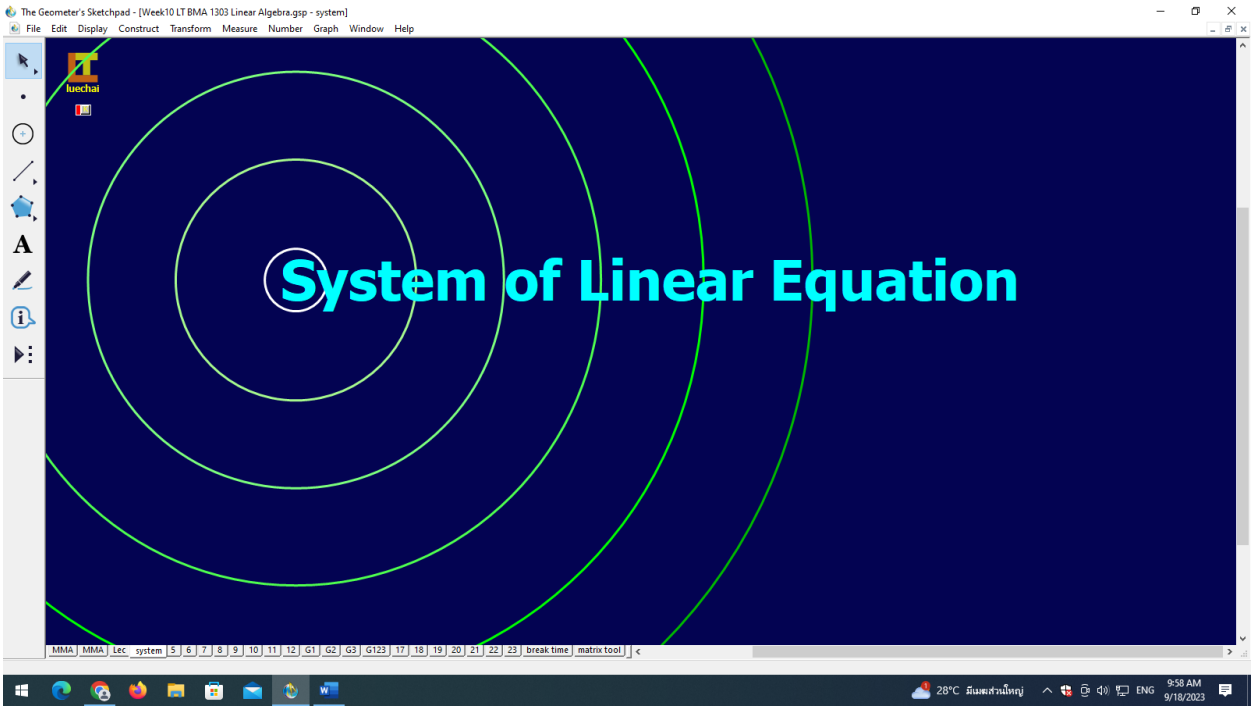
The Geometer's Sketchpad - [Week10 LT BMA 1303 Linear Algebra.gsp - system]
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System of Linear Equation
MMA MMA Lec system 5 6 7 8 9 10 11 12 G1 G2 G3 G123 17 18 19 20 21 22 23 break time matrix tool
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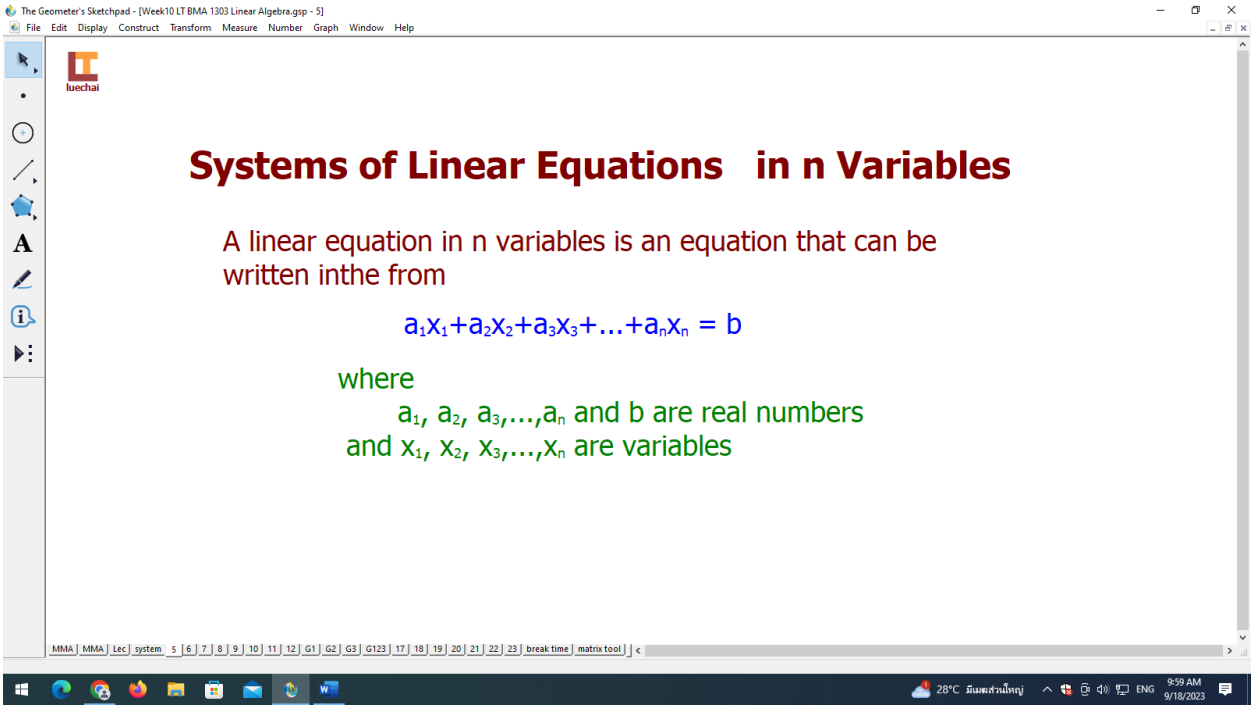
The Geometer's Sketchpad - [Week10 LT BMA 1303 Linear Algebra.gsp - 5]
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Systems of Linear Equations in n Variables
A linear equation in n variables is an equation that can be written inthe from
$a_1x_1+a_2x_2+a_3x_3+...+a_nx_n = b$
where
$a_1, a_2, a_3,...,a_n$ and b are real numbers
and $x_1, x_2, x_3,...,x_n$ are variables
MMA MMA Lec system 5 6 7 8 9 10 11 12 G1 G2 G3 G123 17 18 19 20 21 22 23 break time matrix tool
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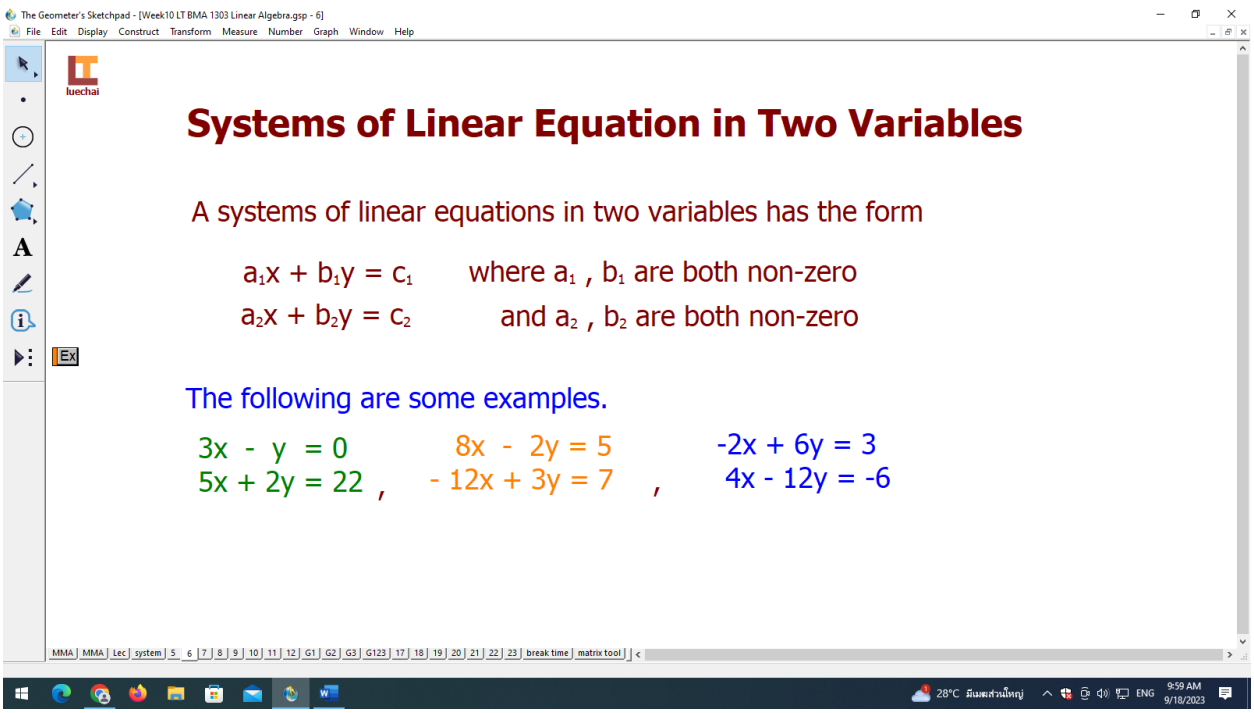
The Geometer's Sketchpad - [Week10 LT BMA 1303 Linear Algebra.gsp - 6]
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Systems of Linear Equation in Two Variables
A systems of linear equations in two variables has the form
$a_1x + b_1y = c_1$ where a_1 , b_1 are both non-zero
$a_2x + b_2y = c_2$ and a_2 , b_2 are both non-zero
Ex
The following are some examples.
3x - y = 0
5x + 2y = 22 ,
8x - 2y = 5
- 12x + 3y = 7 ,
-2x + 6y = 3
4x - 12y = -6
MMA MMA Lec system 5 6 7 8 9 10 11 12 G1 G2 G3 G123 17 18 19 20 21 22 23 break time matrix tool
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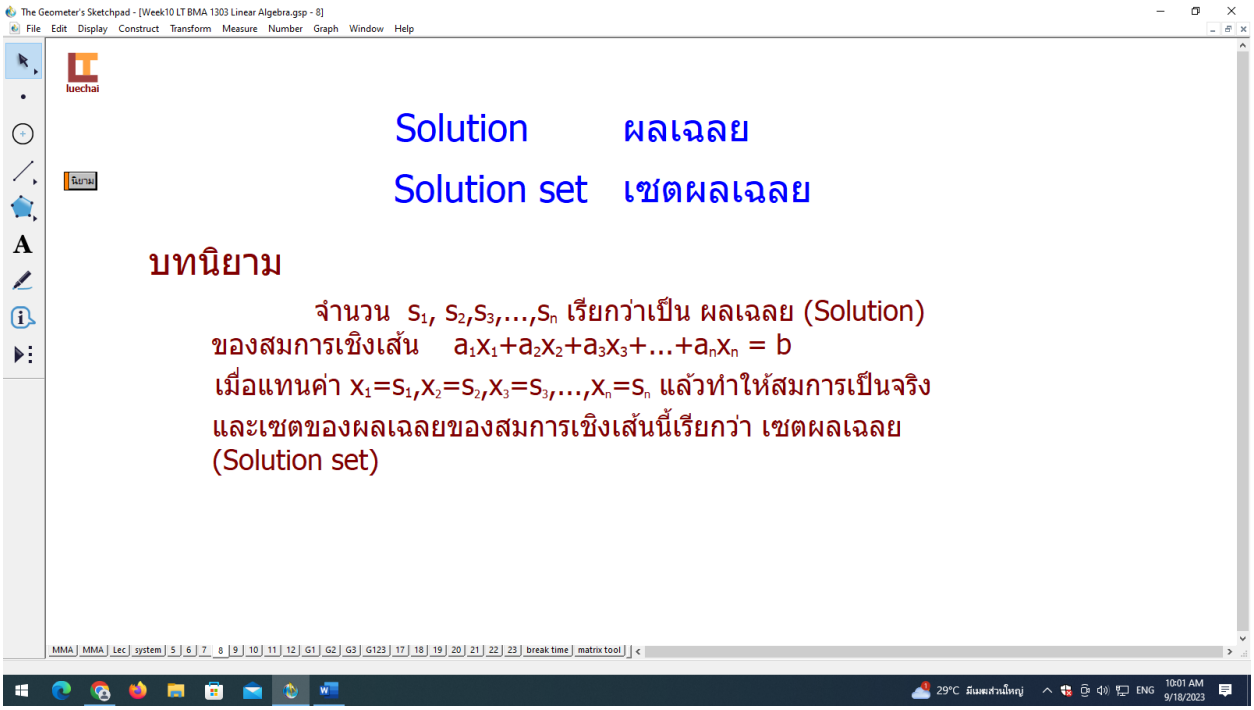
The Geometer's Sketchpad - [Week10 LT BMA 1303 Linear Algebra.gsp - 8]
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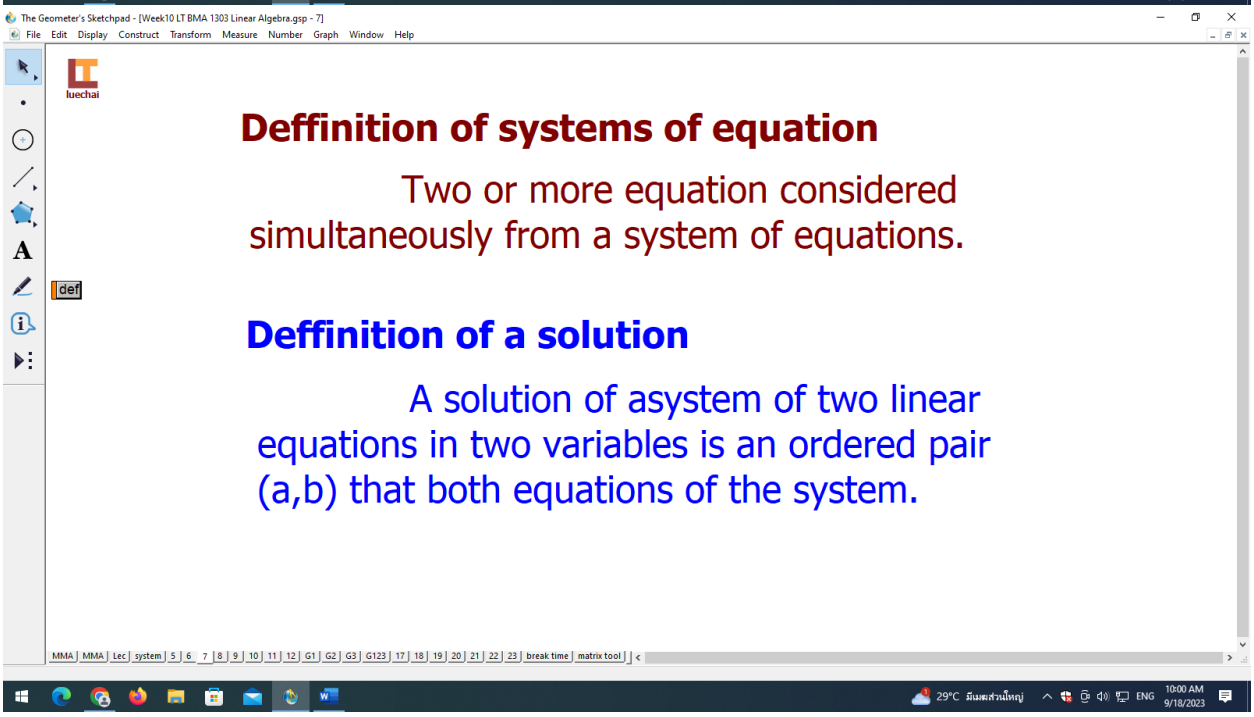
Solution ผลเฉลย
Solution set เซตผลเฉลย
บทนิยาม
จำนวน $s_1, s_2, s_3, \ldots, s_n$ เรียกว่าเป็น ผลเฉลย (Solution) ของสมการเชิงเส้น $a_1x_1+a_2x_2+a_3x_3+\ldots+a_nx_n = b$
เมื่อแทนค่า $x_1=s_1, x_2=s_2, x_3=s_3, \ldots, x_n=s_n$ แล้วทำให้สมการเป็นจริง และเซตของผลเฉลยของสมการเชิงเส้นนี้เรียกว่า เซตผลเฉลย (Solution set)


The Geometer's Sketchpad - [Week10 LT BMA 1303 Linear Algebra.gsp - 7]
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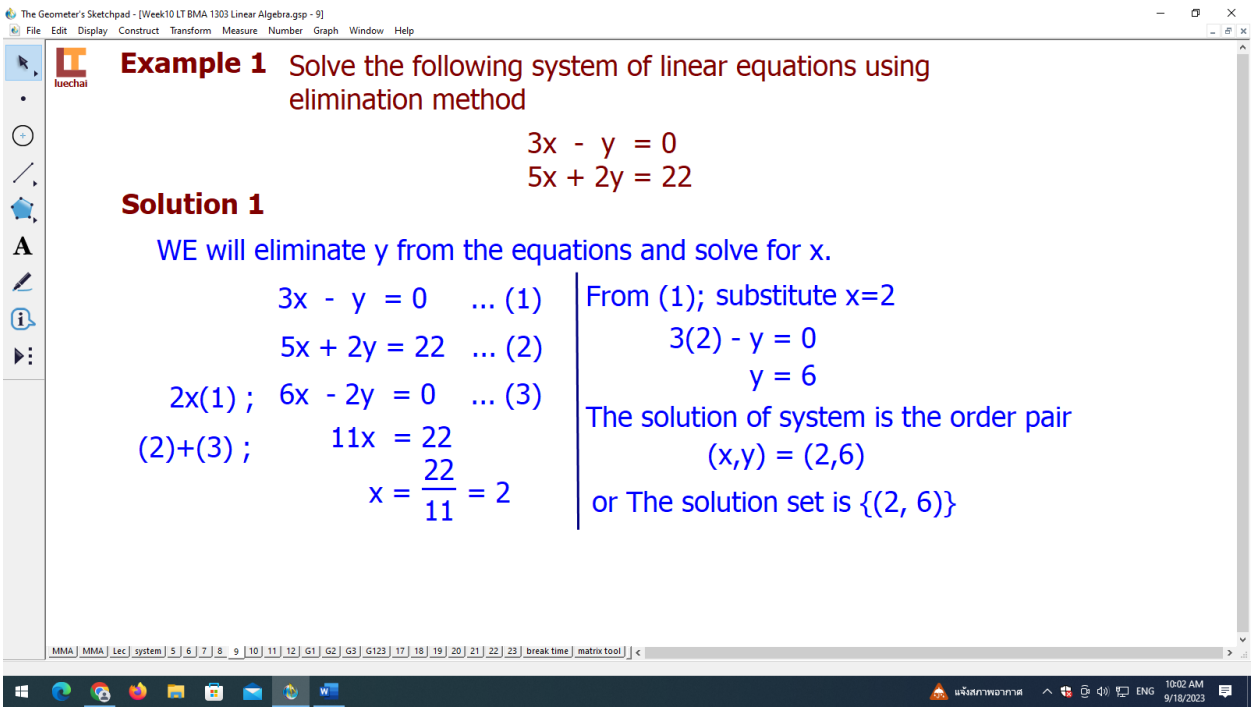
Deffinition of systems of equation
Two or more equation considered simultaneously from a system of equations.
Deffinition of a solution
A solution of asystem of two linear equations in two variables is an ordered pair (a,b) that both equations of the system.


The Geometer's Sketchpad - [Week10 LT BMA 1303 Linear Algebra.gsp - 9]
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Example 1 Solve the following system of linear equations using elimination method
3x - y = 0
5x + 2y = 22
Solution 1
WE will eliminate y from the equations and solve for x.
3x - y = 0 ... (1)
5x + 2y = 22 ... (2)
2x(1) ; 6x - 2y = 0 ... (3)
(2)+(3) ; 11x = 22
x = 22/11 = 2
From (1); substitute x=2
3(2) - y = 0
y = 6
The solution of system is the order pair
(x,y) = (2,6)
or The solution set is {(2, 6)}
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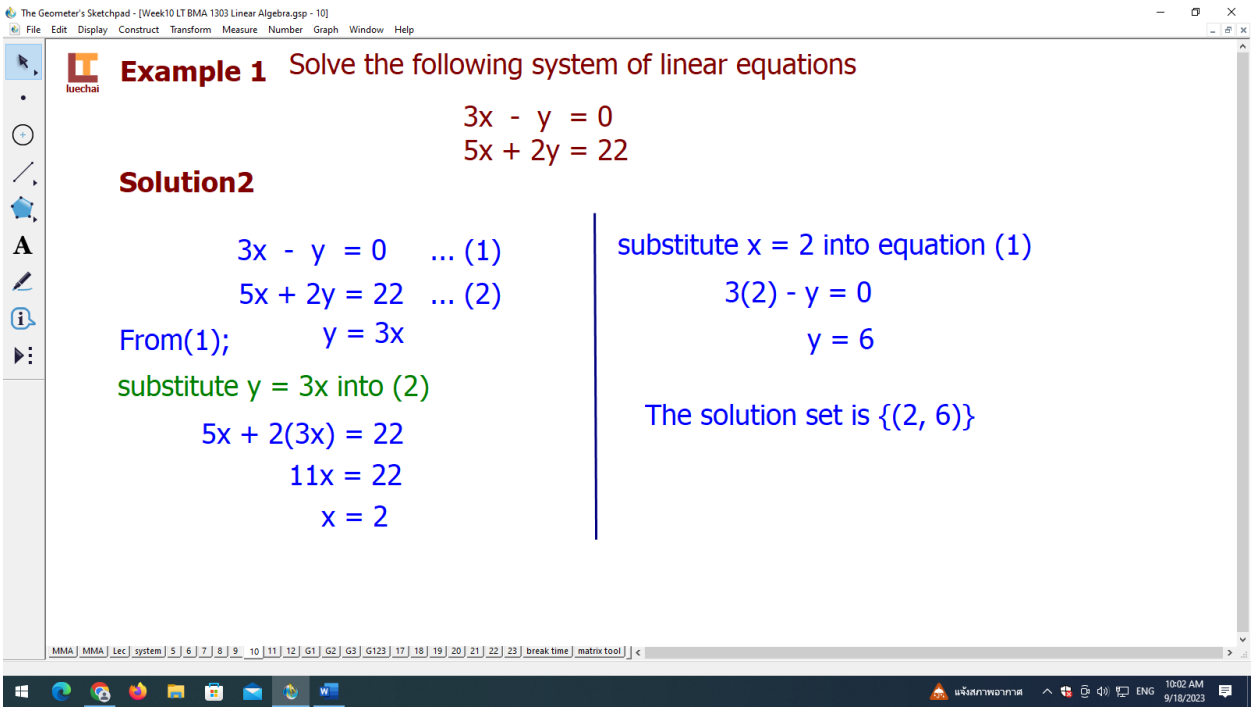
The Geometer's Sketchpad - [Week10 LT BMA 1303 Linear Algebra.gsp - 10]
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Example 1 Solve the following system of linear equations
3x - y = 0
5x + 2y = 22
Solution2
3x - y = 0 ... (1)
5x + 2y = 22 ... (2)
From(1); y = 3x
substitute y = 3x into (2)
5x + 2(3x) = 22
11x = 22
x = 2
substitute x = 2 into equation (1)
3(2) - y = 0
y = 6
The solution set is {(2, 6)}
MMA MMA Lec system 5 6 7 8 9 10 11 12 G1 G2 G3 G123 17 18 19 20 21 22 23 break time matrix tool
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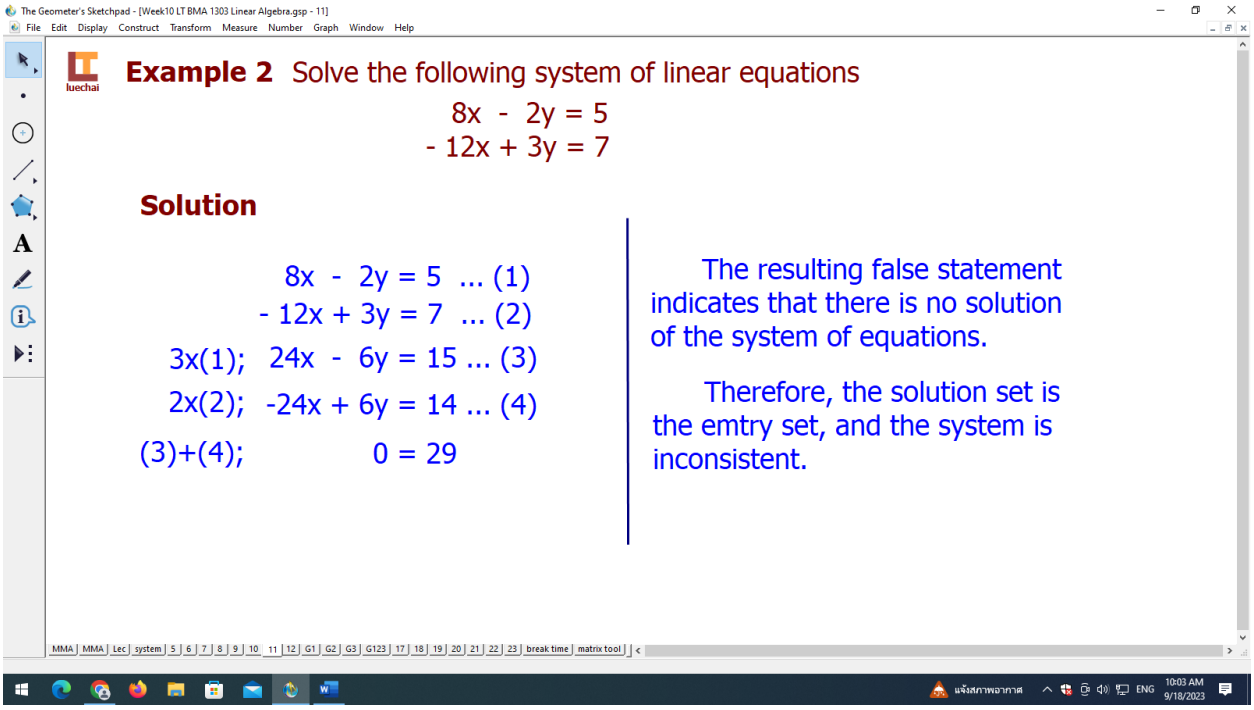
The Geometer's Sketchpad - [Week10 LT BMA 1303 Linear Algebra.gsp - 11]
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Example 2 Solve the following system of linear equations
8x - 2y = 5
- 12x + 3y = 7
Solution
8x - 2y = 5 ... (1)
- 12x + 3y = 7 ... (2)
3x(1); 24x - 6y = 15 ... (3)
2x(2); -24x + 6y = 14 ... (4)
(3)+(4); 0 = 29
The resulting false statement indicates that there is no solution of the system of equations.
Therefore, the solution set is the emtry set, and the system is inconsistent.
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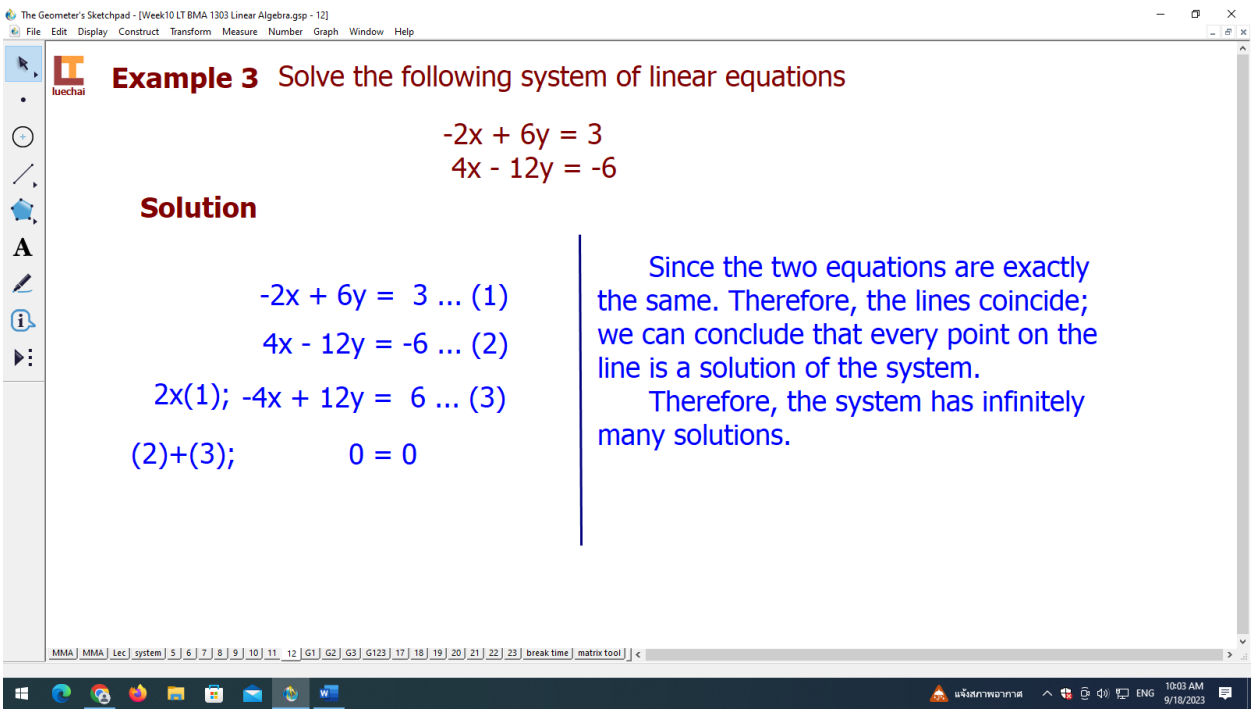
The Geometer's Sketchpad - [Week10 LT BMA 1303 Linear Algebra.gsp - 12]
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Example 3 Solve the following system of linear equations
-2x + 6y = 3
4x - 12y = -6
Solution
-2x + 6y = 3 ... (1)
4x - 12y = -6 ... (2)
2x(1); -4x + 12y = 6 ... (3)
(2)+(3); 0 = 0
Since the two equations are exactly the same. Therefore, the lines coincide; we can conclude that every point on the line is a solution of the system.
Therefore, the system has infinitely many solutions.
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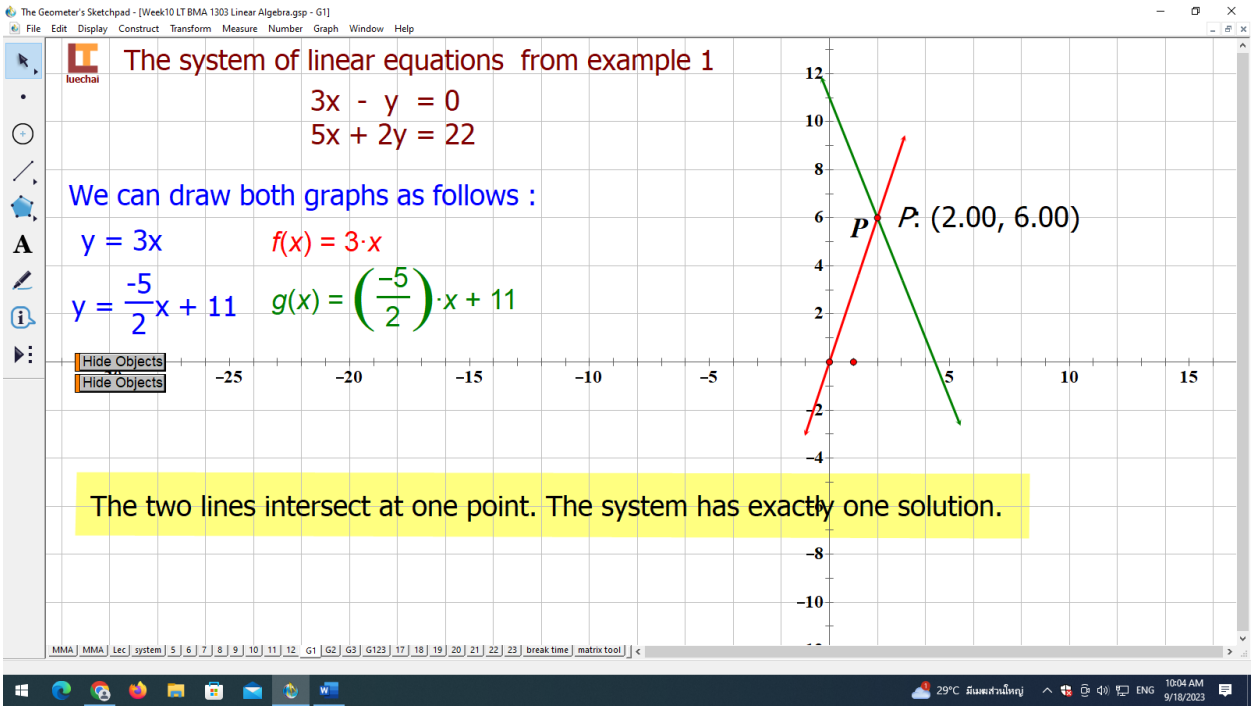
The Geometer's Sketchpad - [Week10 LT BMA 1303 Linear Algebra.gsp - G1]
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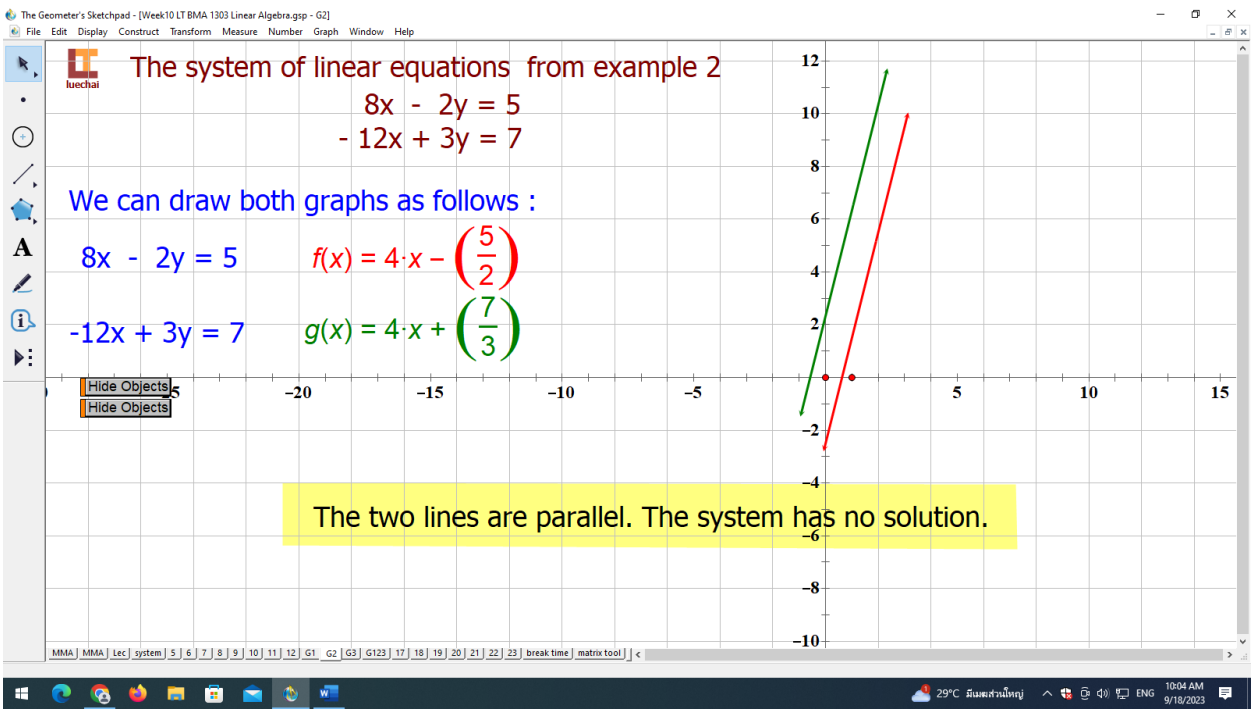
The system of linear equations from example 1
3x - y = 0
5x + 2y = 22
We can draw both graphs as follows :
y = 3x
f(x) = 3·x
y = -5/2 x + 11
g(x) = (-5/2)·x + 11
Hide Objects
Hide Objects
P
P: (2.00, 6.00)
The two lines intersect at one point. The system has exactly one solution.


The Geometer's Sketchpad - [Week10 LT BMA 1303 Linear Algebra.gsp - G2]
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The system of linear equations from example 2
8x - 2y = 5
- 12x + 3y = 7
We can draw both graphs as follows :
8x - 2y = 5
f(x) = 4·x - (5/2)
-12x + 3y = 7
g(x) = 4·x + (7/3)
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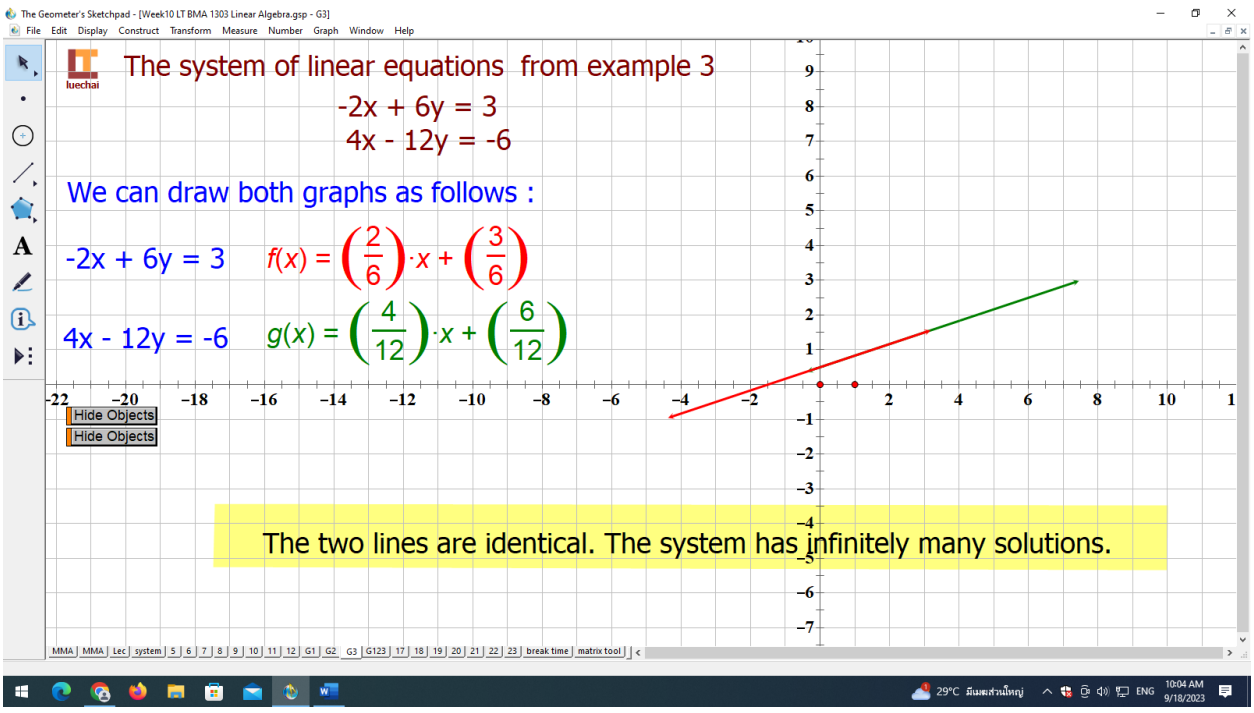
The two lines are parallel. The system has no solution.


The Geometer's Sketchpad - [Week10 LT BMA 1303 Linear Algebra.gsp - G3]
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The system of linear equations from example 3
-2x + 6y = 3
4x - 12y = -6
We can draw both graphs as follows :
-2x + 6y = 3
f(x) = (2/6)·x + (3/6)
4x - 12y = -6
g(x) = (4/12)·x + (6/12)
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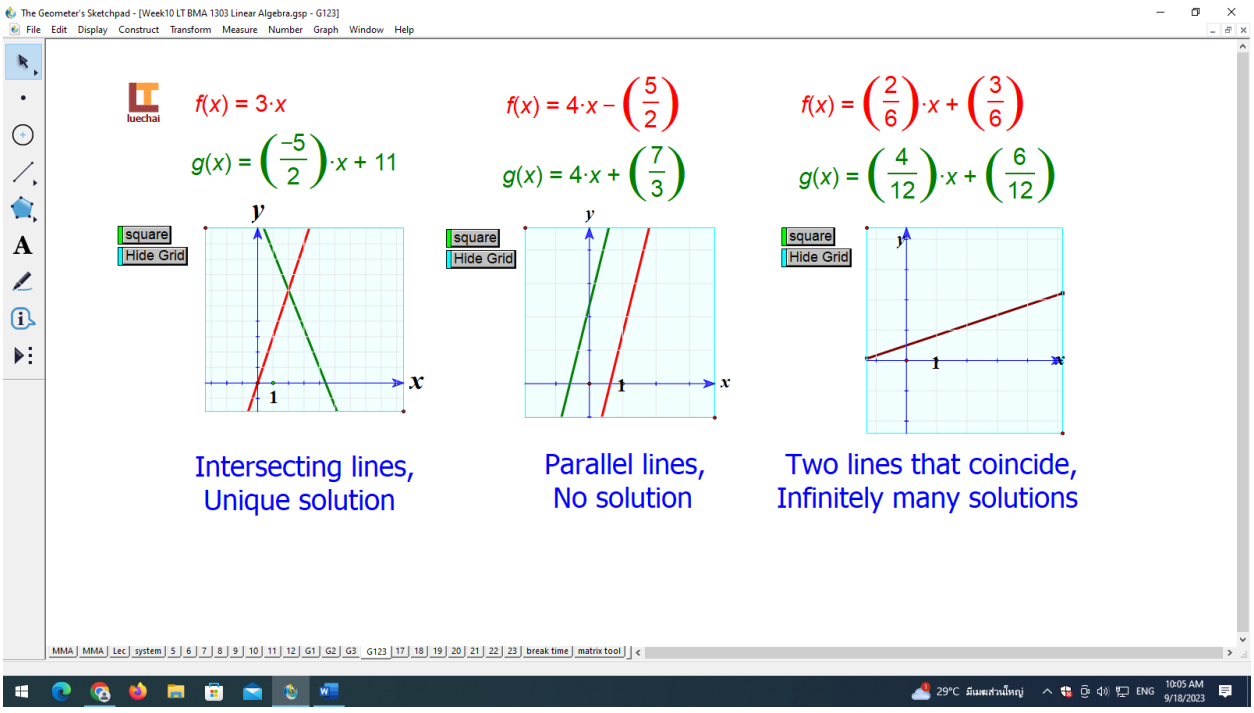
The two lines are identical. The system has infinitely many solutions.


The Geometer's Sketchpad - [Week10 LT BMA 1303 Linear Algebra.gsp - G123]
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f(x) = 3·x
g(x) = (-5/2)·x + 11
square
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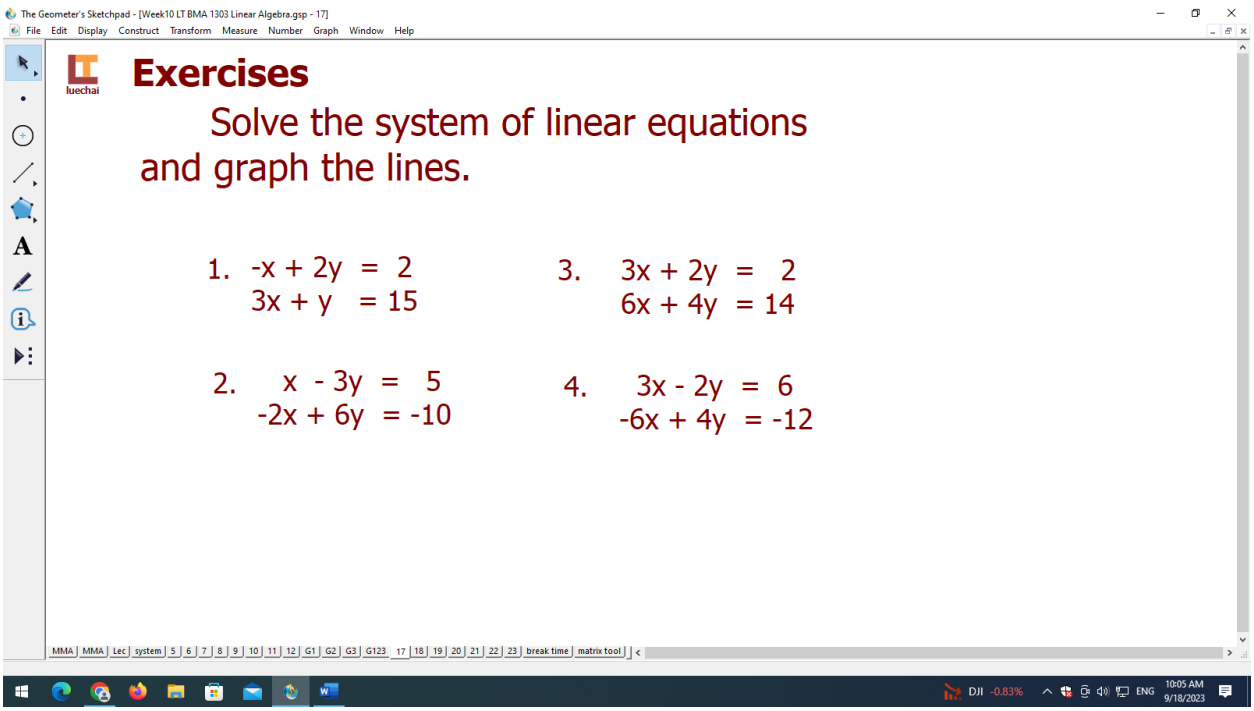
f(x) = 4·x - (5/2)
g(x) = 4·x + (7/3)
square
Hide Grid
f(x) = (2/6)·x + (3/6)
g(x) = (4/12)·x + (6/12)
square
Hide Grid
Intersecting lines,
Unique solution
Parallel lines,
No solution
Two lines that coincide,
Infinitely many solutions


The Geometer's Sketchpad - [Week10 LT BMA 1303 Linear Algebra.gsp - 17]
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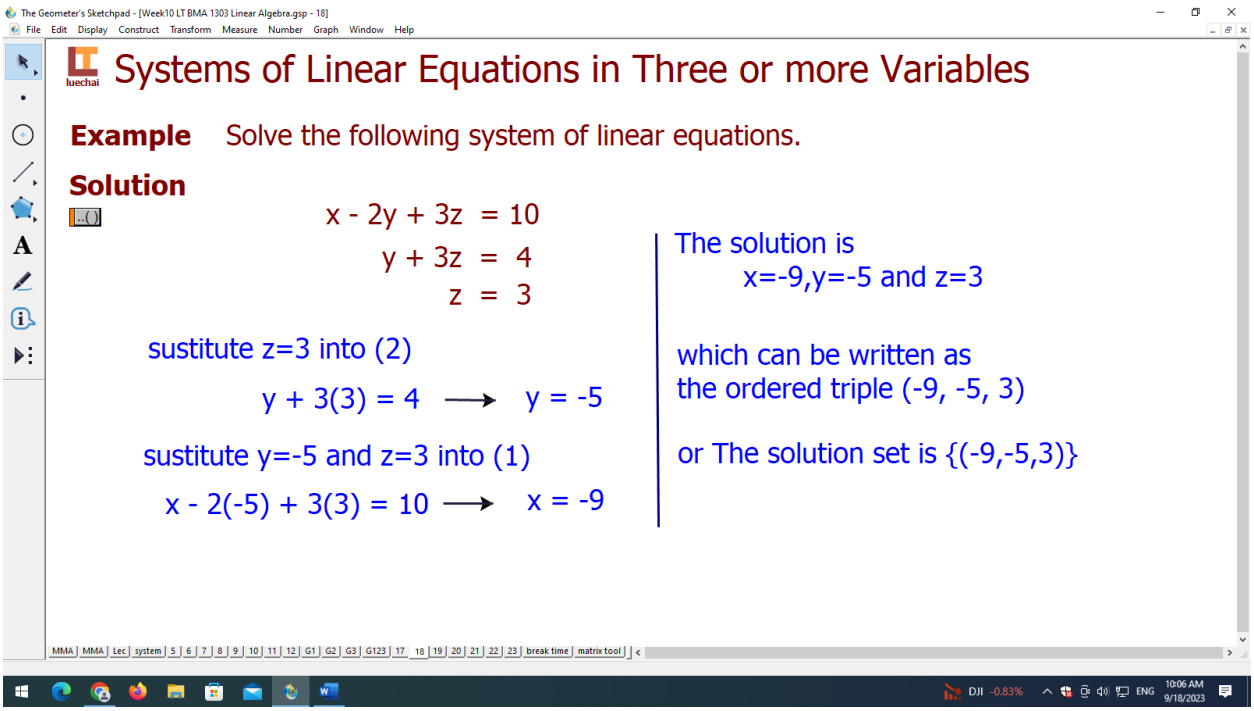
Exercises
Solve the system of linear equations and graph the lines.
1. -x + 2y = 2
3x + y = 15
2. x - 3y = 5
-2x + 6y = -10
3. 3x + 2y = 2
6x + 4y = 14
4. 3x - 2y = 6
-6x + 4y = -12


The Geometer's Sketchpad - [Week10 LT BMA 1303 Linear Algebra.gsp - 18]
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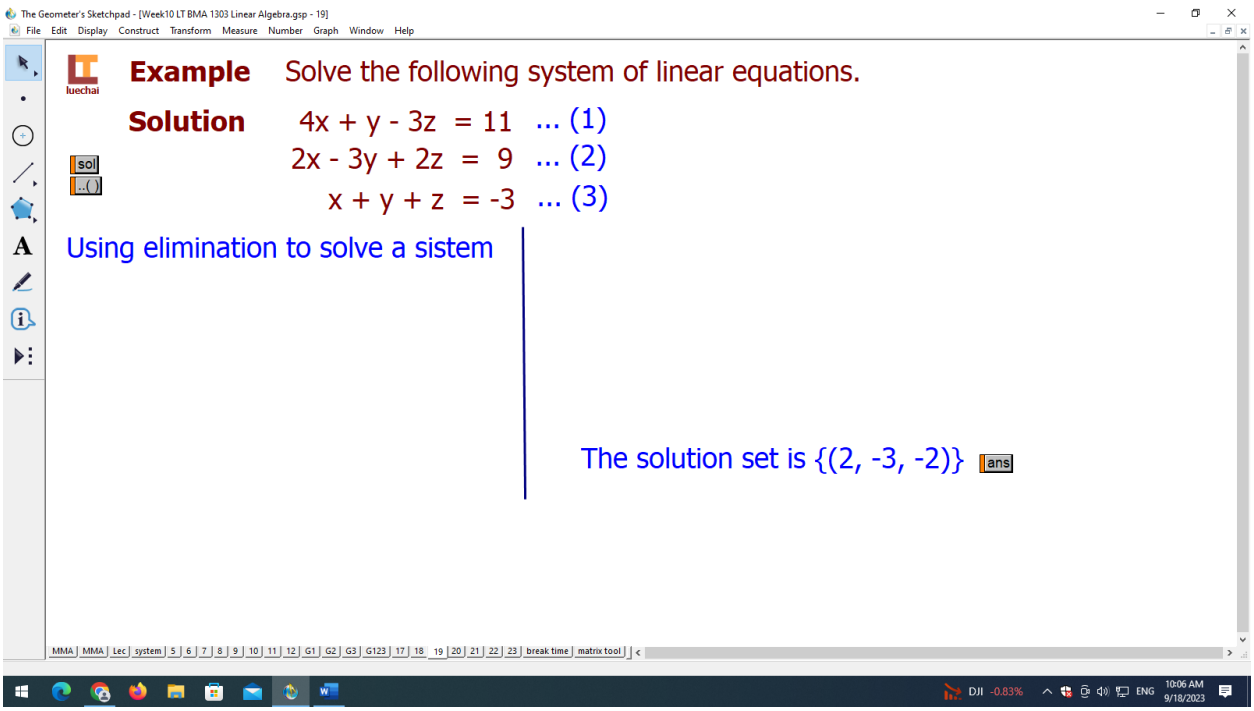
Systems of Linear Equations in Three or more Variables
Example Solve the following system of linear equations.
Solution
x - 2y + 3z = 10
y + 3z = 4
z = 3
sustitute z=3 into (2)
y + 3(3) = 4 ⟶ y = -5
sustitute y=-5 and z=3 into (1)
x - 2(-5) + 3(3) = 10 ⟶ x = -9
The solution is
x=-9,y=-5 and z=3
which can be written as
the ordered triple (-9, -5, 3)
or The solution set is {(-9,-5,3)}


The Geometer's Sketchpad - [Week10 LT BMA 1303 Linear Algebra.gsp - 19]
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Example Solve the following system of linear equations.
Solution
4x + y - 3z = 11 ... (1)
2x - 3y + 2z = 9 ... (2)
x + y + z = -3 ... (3)
sol
...()
Using elimination to solve a sistem
The solution set is {(2, -3, -2)}
ans
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