CHE 1411L Assignment Week 15

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Problem 1a: Solve the following set of equations using MATLAB to determine no, unique, or an infinite solution.

```
A = [-6 2 -2;-3 4 -3;2 4 -7];
B = [15;13;-9];

ra_a = rank(A)
ra_b = rank(B)
ra_c = ra_a/ra_b

if ra_a == ra_b || ra_a == length(A)
   fprintf("The set as a unique solution.")
else if ra_a == ra_b || ra_b < length(A)
    fprintf("The set has infinite solutions.")
else
    fprintf("The set has no solution.")
end
end

X = inv(A) * B
```

```
ra_a =

     3


ra_b =

     1


ra_c =
```

```
     3

The set as a unique solution.
X =

   -2.1951
    3.6707
    2.7561
```

Problem 1b: Solve the following set of equations using MATLAB to determine no, unique, or an infinite solution.

```
A = [1 1;1 -1;2 -5];
B = [3;1;10];

ra_a = rank(A)
ra_b = rank(B)
ra_c = ra_a/ra_b

if ra_a == ra_b || ra_a == length(A)
   fprintf("The set as a unique solution.")
else if ra_a == ra_b || ra_b < length(A)
    fprintf("The set has infinite solutions. Use left division.")
else
    fprintf("The set has no solution.")
end
end

X = A\B


ra_a =

     2


ra_b =

     1


ra_c =

     2

The set has infinite solutions. Use left division.
X =
```

```
    2.7097
   -0.7742
```

Problem 2: Solve the system of two nonlinear equations using Excel solver.

This problem was solved in Excel attached at the end of this MATLAB published pdf.

Problem 3a: Use Goal Seek and Solver in Excel to solve the problem.

This problem was solved in Excel attached at the end of this MATLAB published pdf.

Problem 3b: Use MATLAB to solve the problem: a) create a function, b) create a script using 'fzero' and format output at 'fprintf'

```
x0 = 0.9;
f_x = @thermo_15;
eq_comp = fzero(f_x, x0)

CO_comp_s = 1;
H2O_comp_s = 1;
CO2_comp_s = 0;
H2_comp_s = 0;
to_comp_s = 2;

CO_comp_e = 1-eq_comp;
H2O_comp_e = 1-eq_comp;
CO2_comp_e = eq_comp;
H2_comp_e = eq_comp;
to_comp_e = 2;

yi_co = CO_comp_e/to_comp_e;
yi_h2o = H2O_comp_e/to_comp_e;
yi_co2 = CO2_comp_e/to_comp_e;
yi_h2 = H2_comp_e/to_comp_e;

fprintf("The starting compositions of:\nCO was %d, \nH2O was %d, \nCO2 was %d,
 \nand H2 was %d.\n", CO_comp_s,H2O_comp_s,CO2_comp_s,H2_comp_s)
fprintf("\nThe ending compositions of:\nCO was %d, \nH2O was %d, \nCO2 was %d,
 \nand H2 was %d.\n", CO_comp_e,H2O_comp_e,CO2_comp_e,H2_comp_e)
fprintf("\nThe yi of:\nCO was %d, \nH2O was %d, \nCO2 was %d, \nand H2 was %d.
\n", yi_co, yi_h2o, yi_co2, yi_h2)


eq_comp =
```

```
    0.9241

The starting compositions of:
CO was 1,
H2O was 1,
CO2 was 0,
and H2 was 0.

The ending compositions of:
CO was 7.586129e-02,
H2O was 7.586129e-02,
CO2 was 9.241387e-01,
and H2 was 9.241387e-01.

The yi of:
CO was 3.793064e-02,
H2O was 3.793064e-02,
CO2 was 4.620694e-01,
and H2 was 4.620694e-01.
```

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Problem 2

Function		Variable	
f1	0.999994	x	0.489057
f2	0.999999	y	1.233548

Problem 3a

Goal Seek

Function			Variable	
f1	0.000761		x	0.924139

	Start	End	Yi
CO	1	0.075861	0.037931
H_20	1	0.075861	0.037931
CO_2	0	0.924139	0.462069
H_2	0	0.924139	0.462069
Total	2	2	1

Solver

f1	3.98E-13	x	0.924139

	Start	End	Yi
CO	1	0.075861	0.037931
H_20	1	0.075861	0.037931
CO_2	0	0.924139	0.462069
H_2	0	0.924139	0.462069
Total	2	2	1

```
function f = thermo_15(x)

f = 148.4-(x^2/(1-x)^2);
```

```
Not enough input arguments.

Error in thermo_15 (line 3)
f = 148.4-(x^2/(1-x)^2);
```

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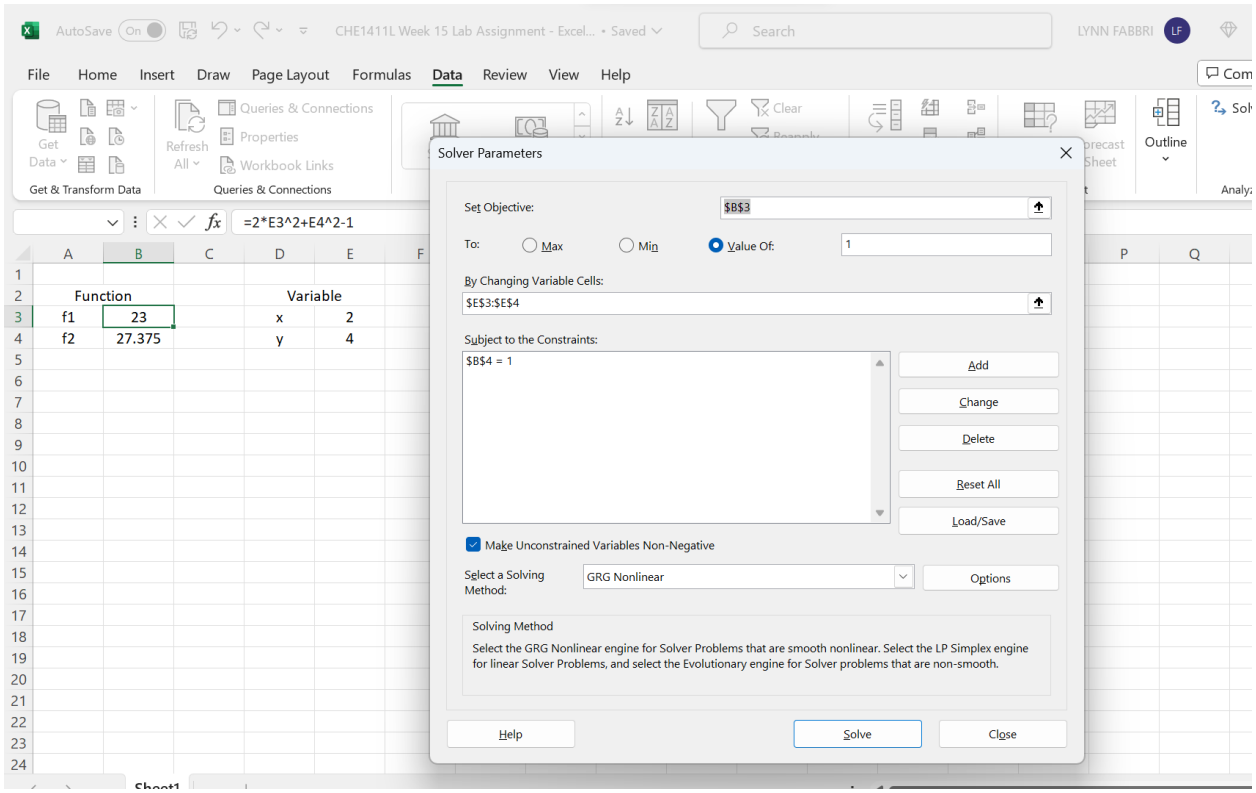
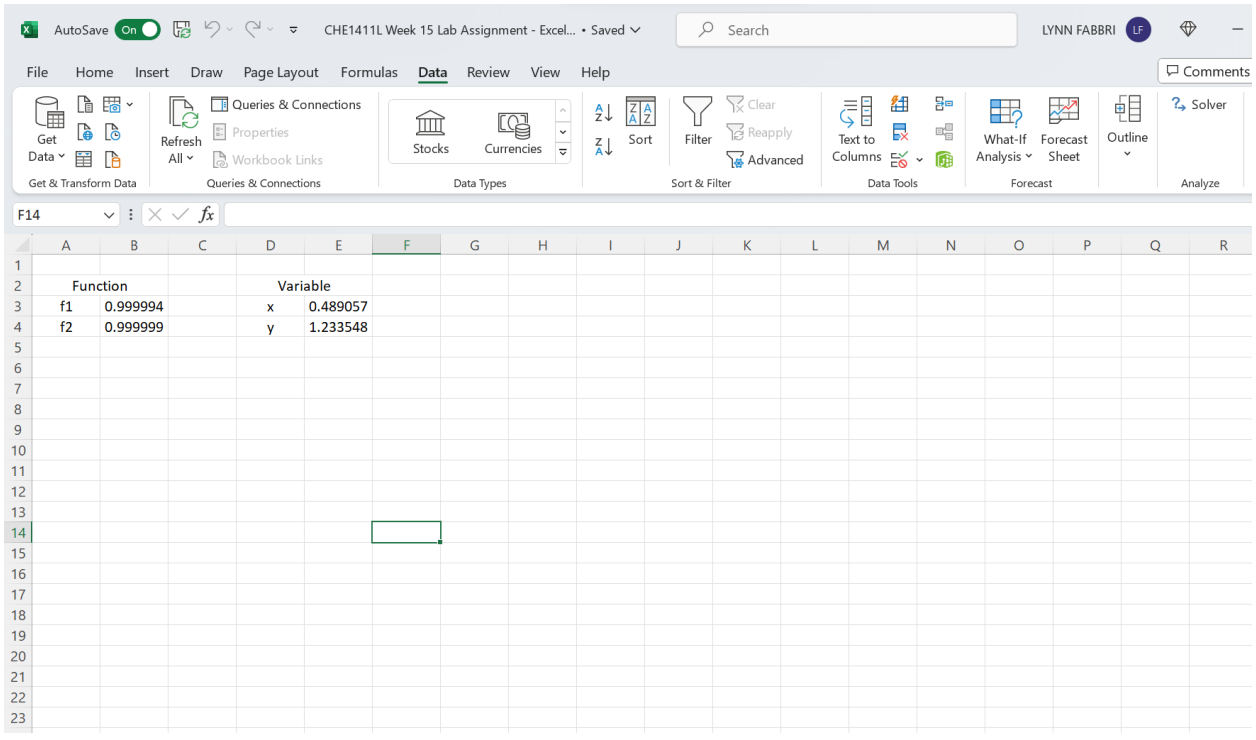
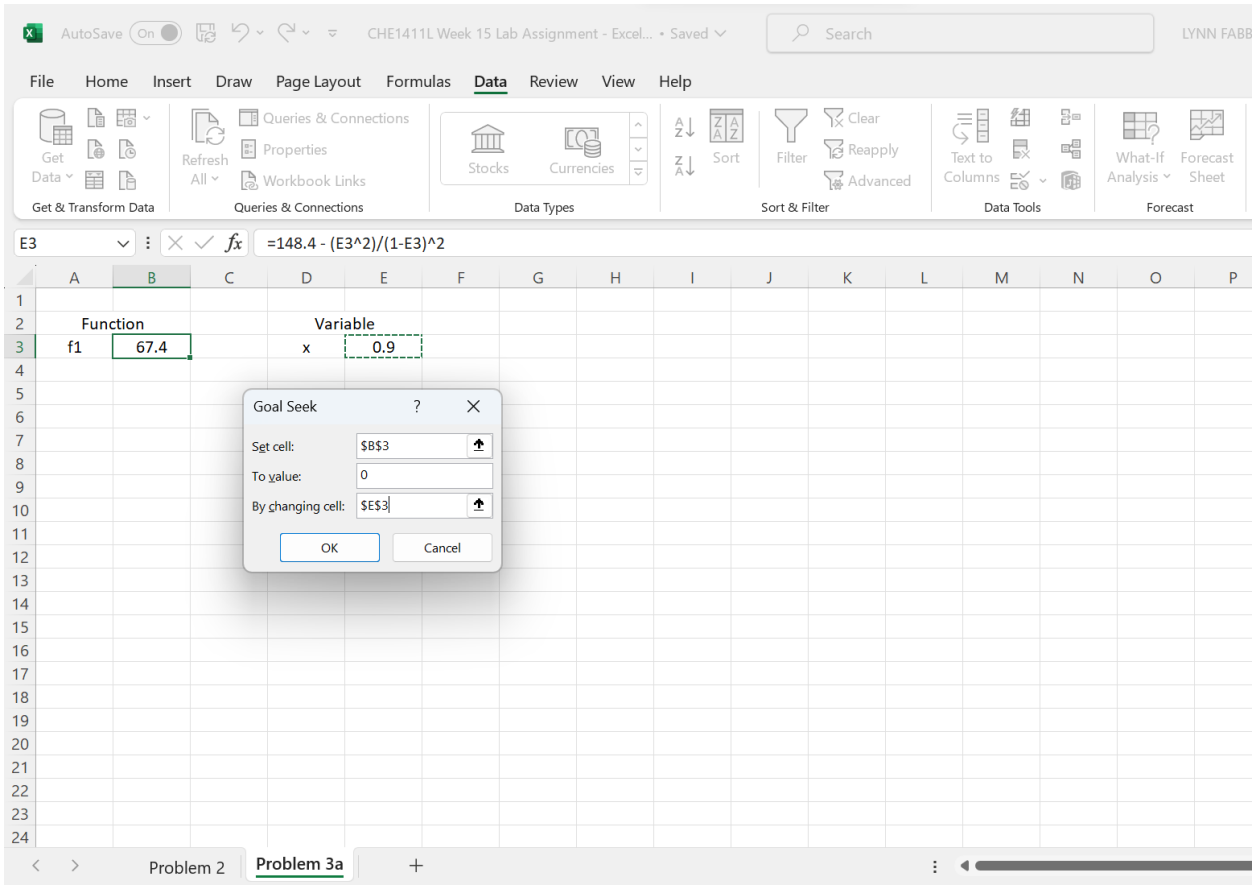
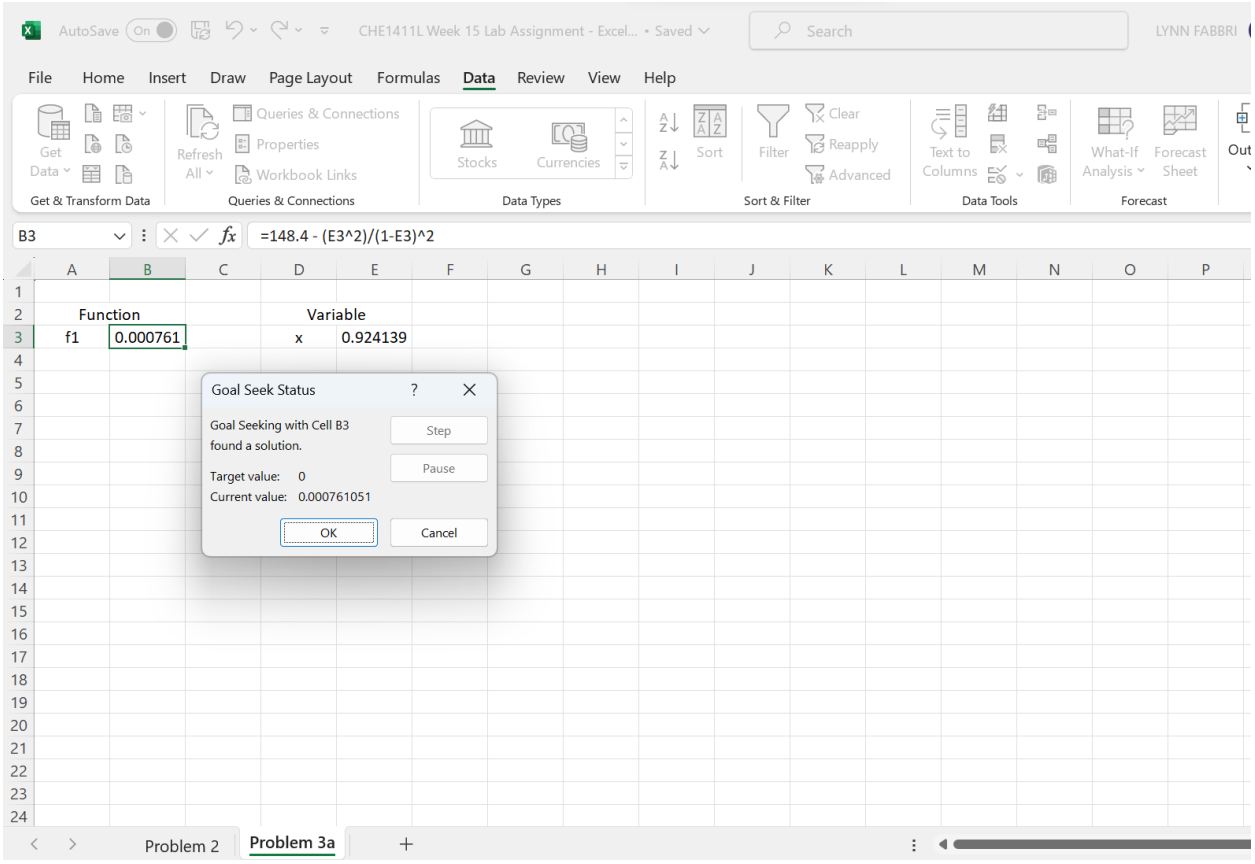
Problem 2:


CHE1411L Week 15 Lab Assignment - Excel... • Saved
LYNN FABBRI
File Home Insert Draw Page Layout Formulas Data Review View Help
Solver Parameters
Set Objective: $B$3
To: Max Min Value Of: 1
By Changing Variable Cells: $E$3:$E$4
Subject to the Constraints: $B$4 = 1
Add
Change
Delete
Reset All
Load/Save
Make Unconstrained Variables Non-Negative
Select a Solving Method: GRG Nonlinear
Options
Solving Method
Select the GRG Nonlinear engine for Solver Problems that are smooth nonlinear. Select the LP Simplex engine for linear Solver Problems, and select the Evolutionary engine for Solver problems that are non-smooth.
Help
Solve
Close
=2*E3^2+E4^2-1
Function
Variable
f1 23 x 2
f2 27.375 y 4


CHE1411L Week 15 Lab Assignment - Excel... • Saved
LYNN FABBRI
File Home Insert Draw Page Layout Formulas Data Review View Help
Function
Variable
f1 0.999994 x 0.489057
f2 0.999999 y 1.233548

Problem 3a:
Goal Seek:




AutoSave On
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Search
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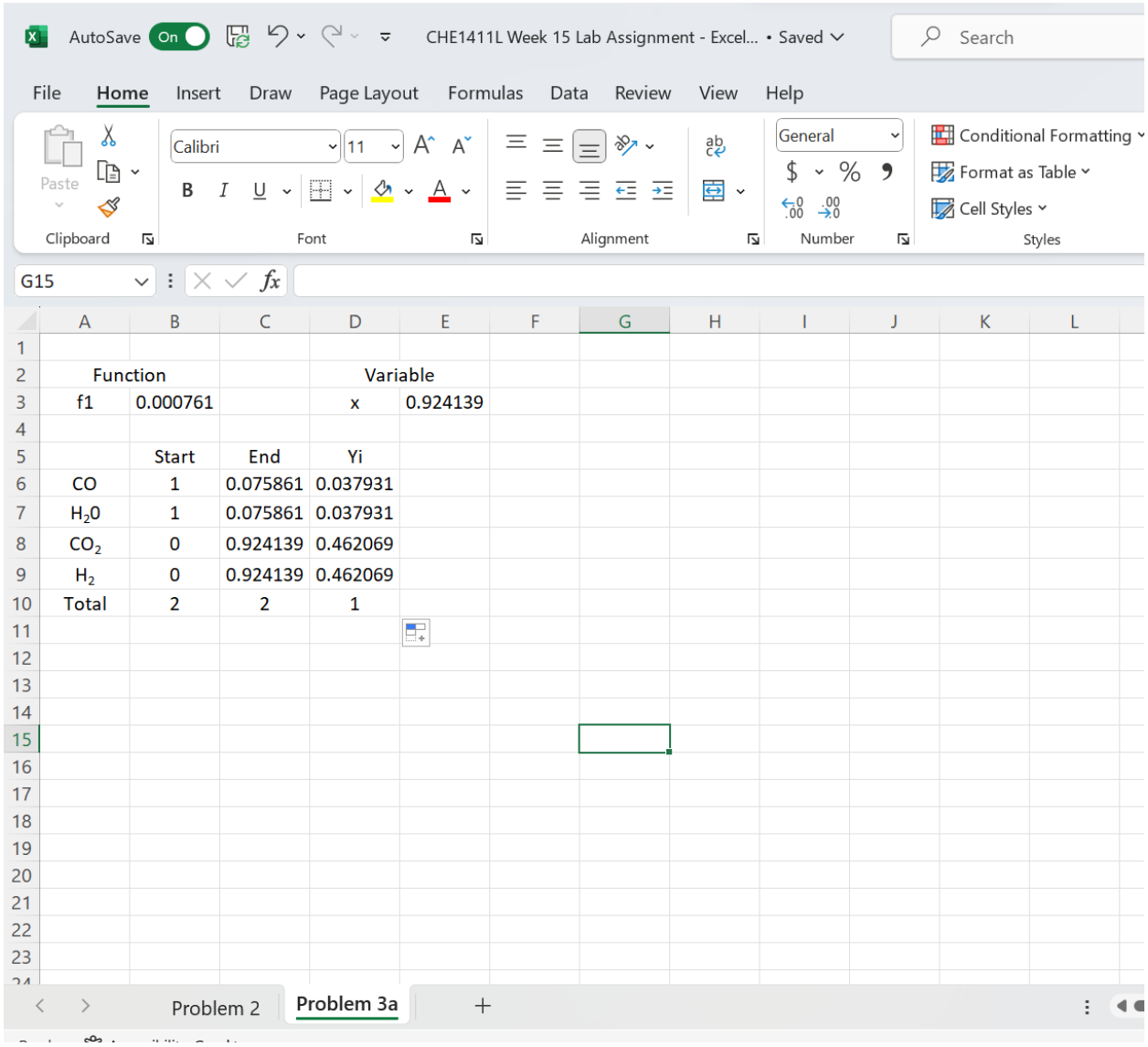
Get Data
Refresh All
Queries & Connections
Properties
Workbook Links
Get & Transform Data
Queries & Connections
Stocks
Currencies
Data Types
Sort
Filter
Clear
Reapply
Advanced
Sort & Filter
Text to Columns
Data Tools
What-If Analysis
Forecast Sheet
Forecast
B3
=148.4 - (E3^2)/(1-E3)^2
Function
Variable
f1
0.000761
x
0.924139
Goal Seek Status
Goal Seeking with Cell B3 found a solution.
Target value: 0
Current value: 0.000761051
Step
Pause
OK
Cancel
Problem 2
Problem 3a



	A	B	C	D	E
2	Function			Variable	
3	f1	0.000761		x	0.924139
5		Start	End	Yi	
6	CO	1	0.075861	0.037931	
7	H_20	1	0.075861	0.037931	
8	CO_2	0	0.924139	0.462069	
9	H_2	0	0.924139	0.462069	
10	Total	2	2	1	

Solver Gives the Same Answer: