

Introduction

This is the user guide created for navigating and operating the *web application* for CMSC 150 Exercise 10. Included here are the contents of the zip file, system requirements, and step-by-step tutorial on how to launch and operate the application. Thank you for checking the app!

Contents

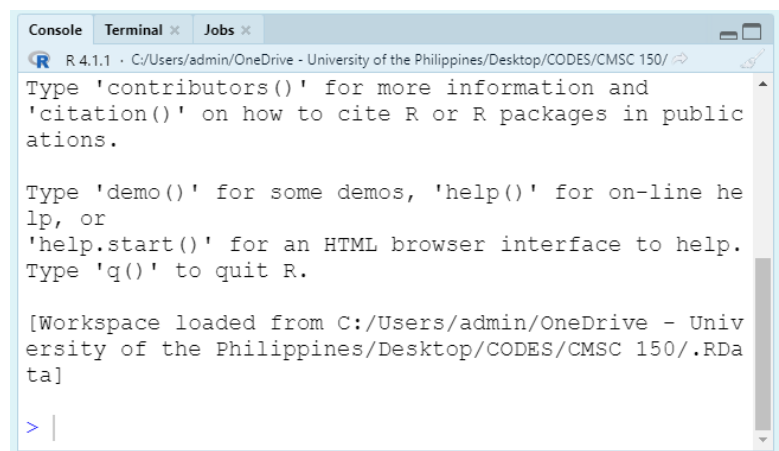
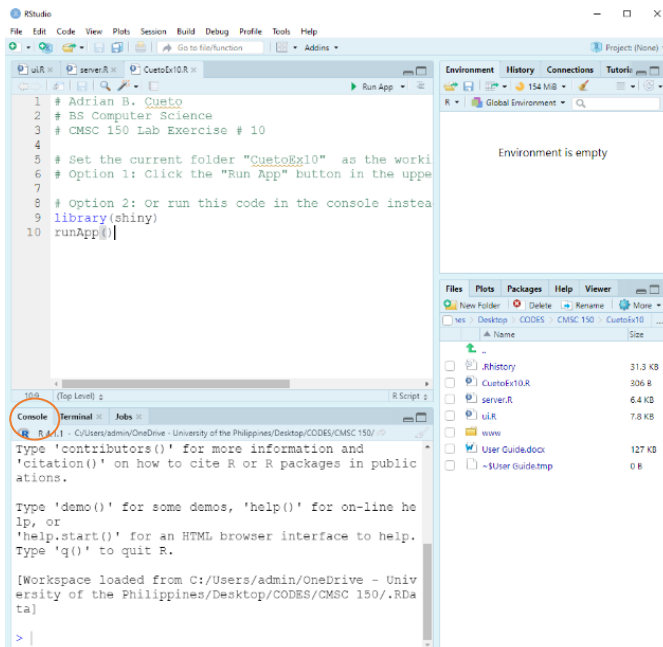
The zip file or folder named *CuetoEx10* should contain these following files for the program to work correctly:

- CuetoEx10.R
- server.R
- ui.R
- README.txt
- User Guide.pdf
- Folder named *www* that includes these following files:
 - CuetoEx08.R
 - CuetoEx09.R
 - navbar.png
 - qsi.png
 - simplex.png

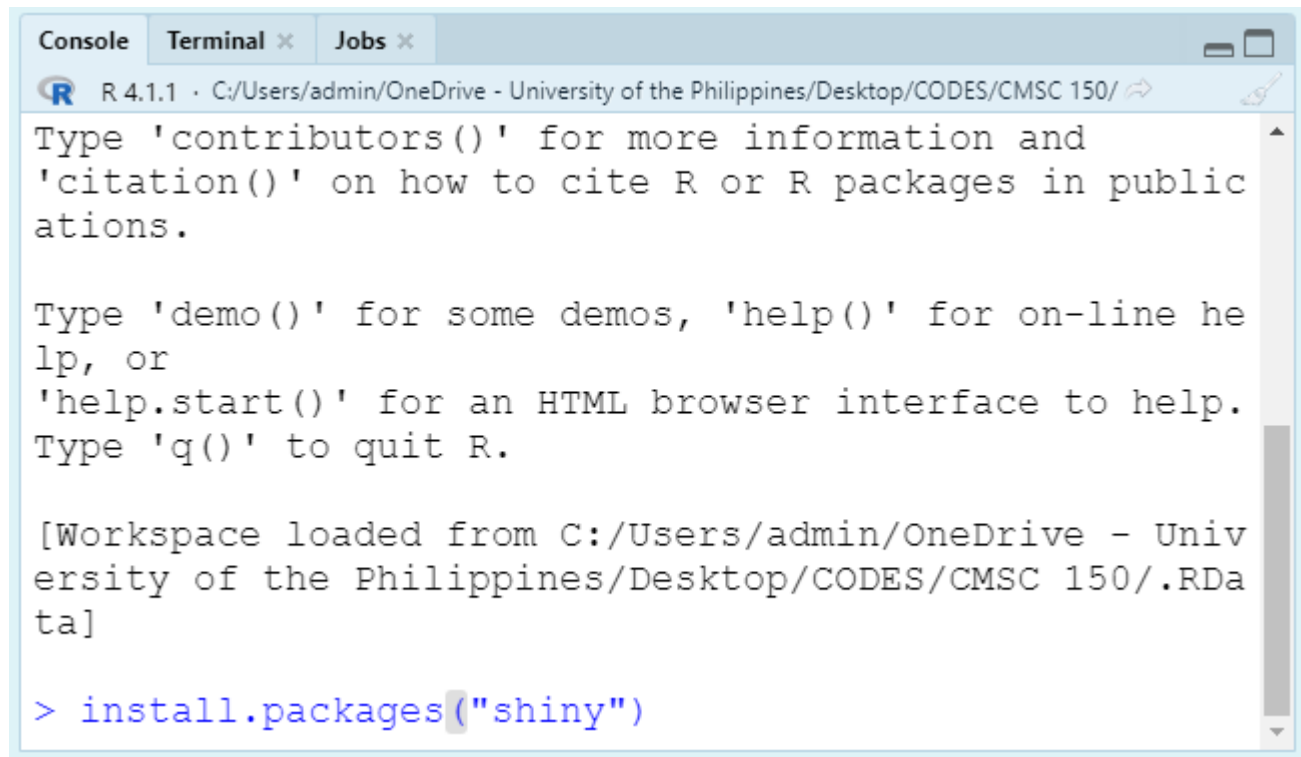
System Requirements and Installation of Programs

These ff. programs are needed to run the *web-app* properly:

- R and RStudio – these are the programming language and IDE used to run the application
 - Download R from CRAN (The comprehensive R Archive Network). Select the link appropriate for your operating system). Link: <https://cran.r-project.org/>
 - Download RStudio from the RStudio Website. Select the free open-source Desktop Version. Link: <https://rstudio.com/products/rstudio/download/>
- R Shiny (Install R and RStudio first) – this is the package used to integrate the R scripts into a working *web app*
 - Step 1: Open RStudio, then look for the *Console* window on the bottom left corner of the window



- Step 2: Enter the code `install.packages("shiny")` in the console to install R Shiny



```
R 4.1.1 · C:/Users/admin/OneDrive - University of the Philippines/Desktop/CODES/CMSC 150/

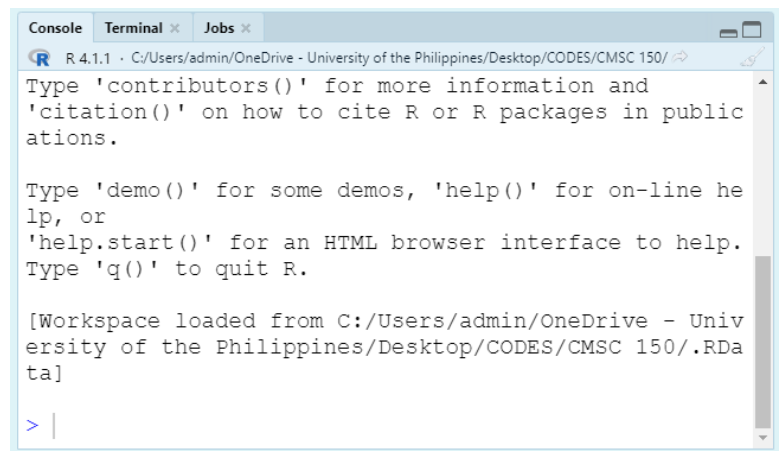
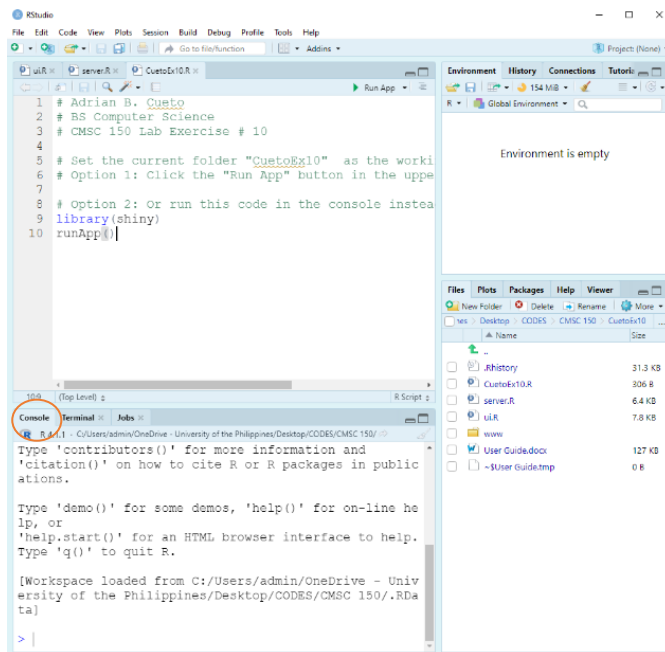
Type 'contributors()' for more information and
'citation()' on how to cite R or R packages in public
ations.

Type 'demo()' for some demos, 'help()' for on-line he
lp, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

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ersity of the Philippines/Desktop/CODES/CMSC 150/.RDa
ta]

> install.packages("shiny")
```

- R Shiny Matrix (shinyMatrix)
 - Step 1: Open RStudio, then look for the *Console* window on the bottom left window of the IDE



```
R 4.1.1 · C:/Users/admin/OneDrive - University of the Philippines/Desktop/CODES/CMSC 150/

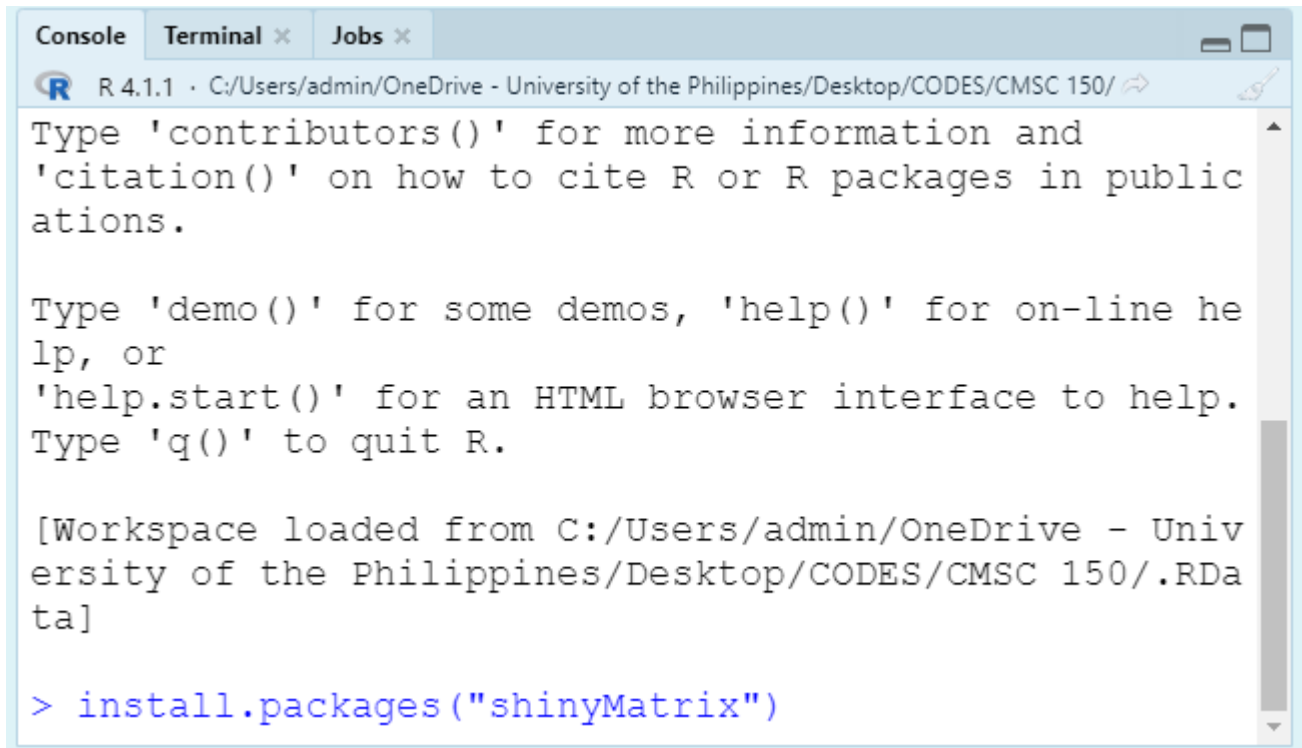
Type 'contributors()' for more information and
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Type 'q()' to quit R.

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ersity of the Philippines/Desktop/CODES/CMSC 150/.RDa
ta]

> |
```

- Step 2: Input the code `install.packages("shinyMatrix")` in the console to install R Shiny Matrix



```
R 4.1.1 · C:/Users/admin/OneDrive - University of the Philippines/Desktop/CODES/CMSC 150/

Type 'contributors()' for more information and
'citation()' on how to cite R or R packages in public
ations.

Type 'demo()' for some demos, 'help()' for on-line he
lp, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

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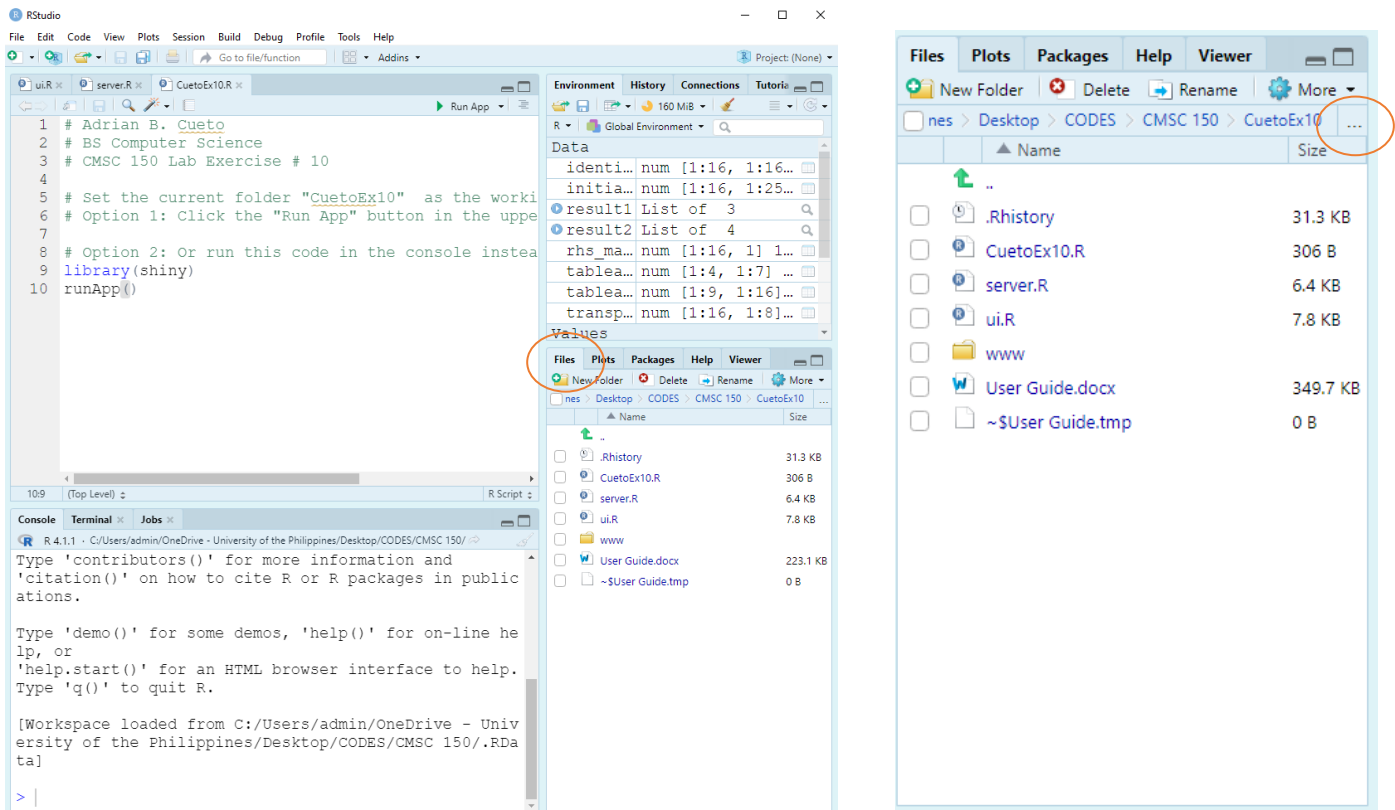
> install.packages("shinyMatrix")
```

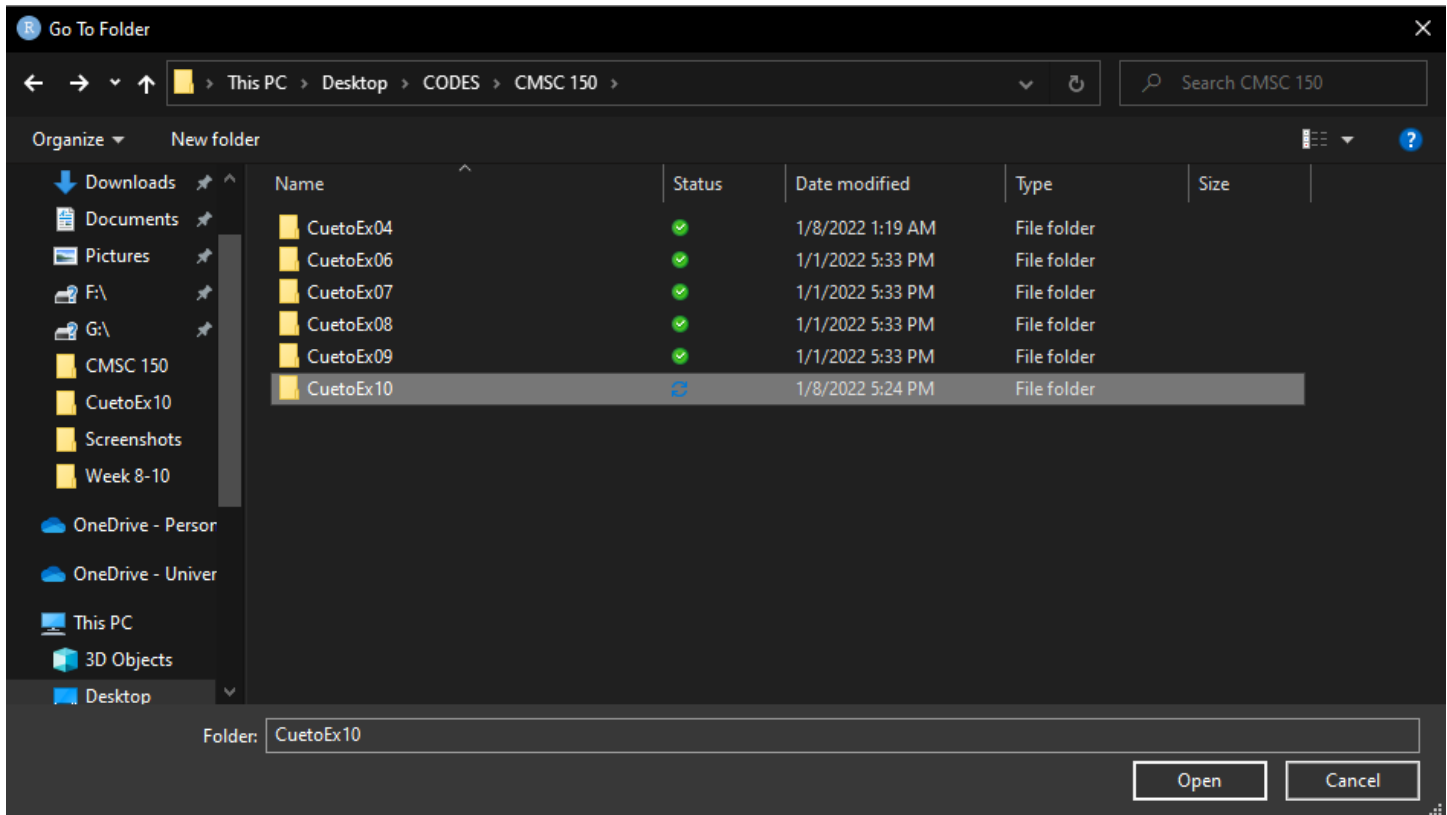
- Web Browser (optional) – this will be used to run the *web application*.

How to run the web application

Step 1: Extract the zip file *CuetoEx10.zip* into the folder *CuetoEx10*

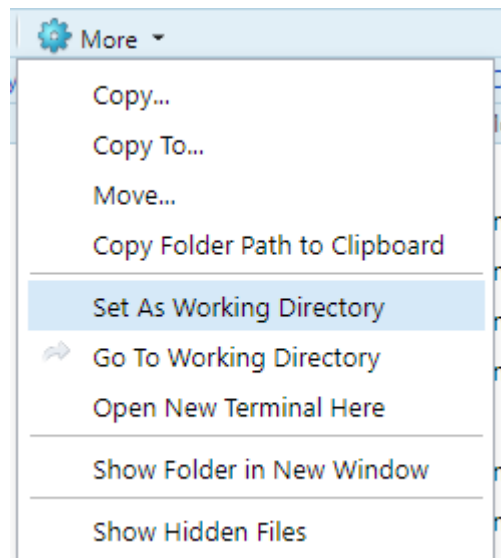
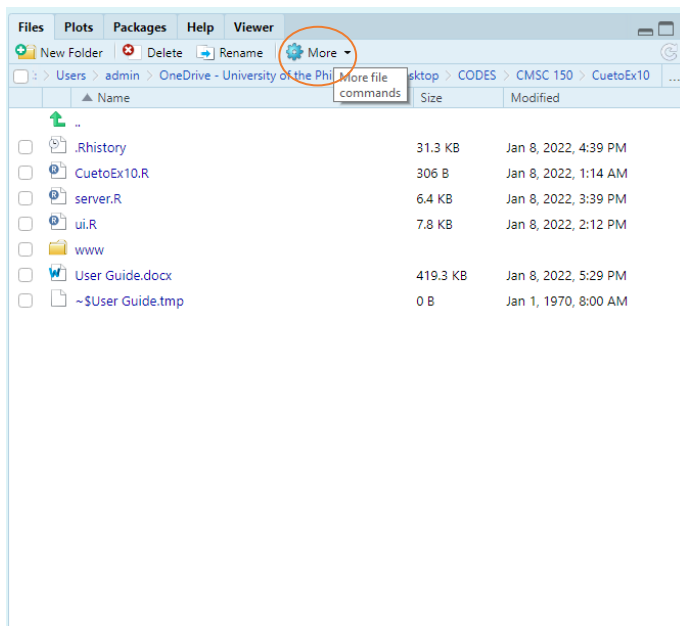
Step 2: Open RStudio and open the folder *CuetoEx10* in the bottom right window of the application





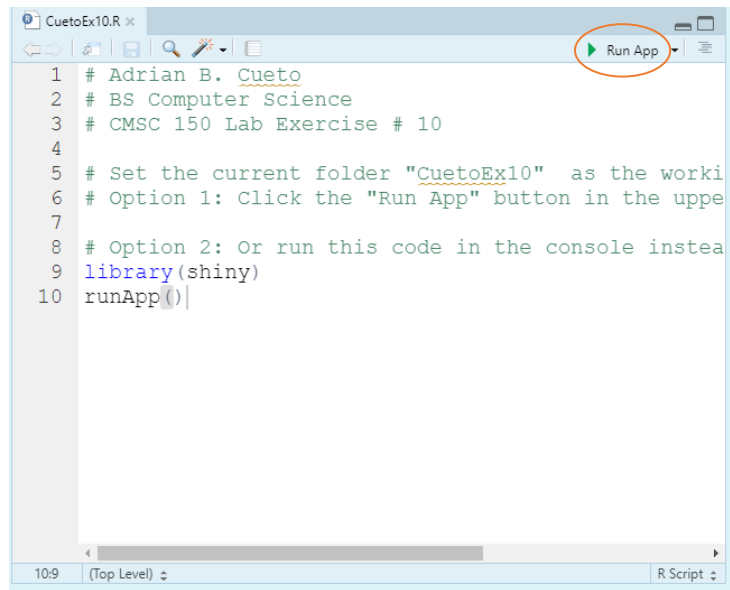
note: select the folder where the files of *CuetoEx10.zip* are extracted.

Step 3: Set the current folder as the working directory



Step 4: Open the file *CuetoEx10.R* then run the program

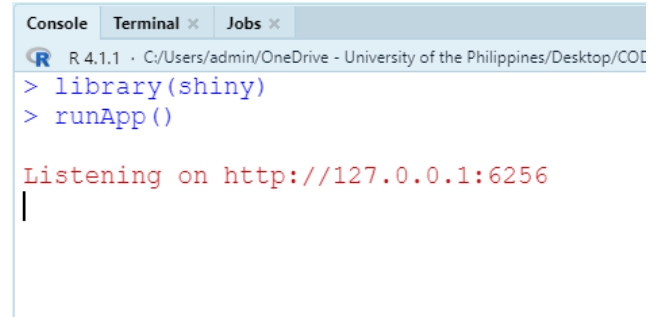
Option 1: Click the *Run App*



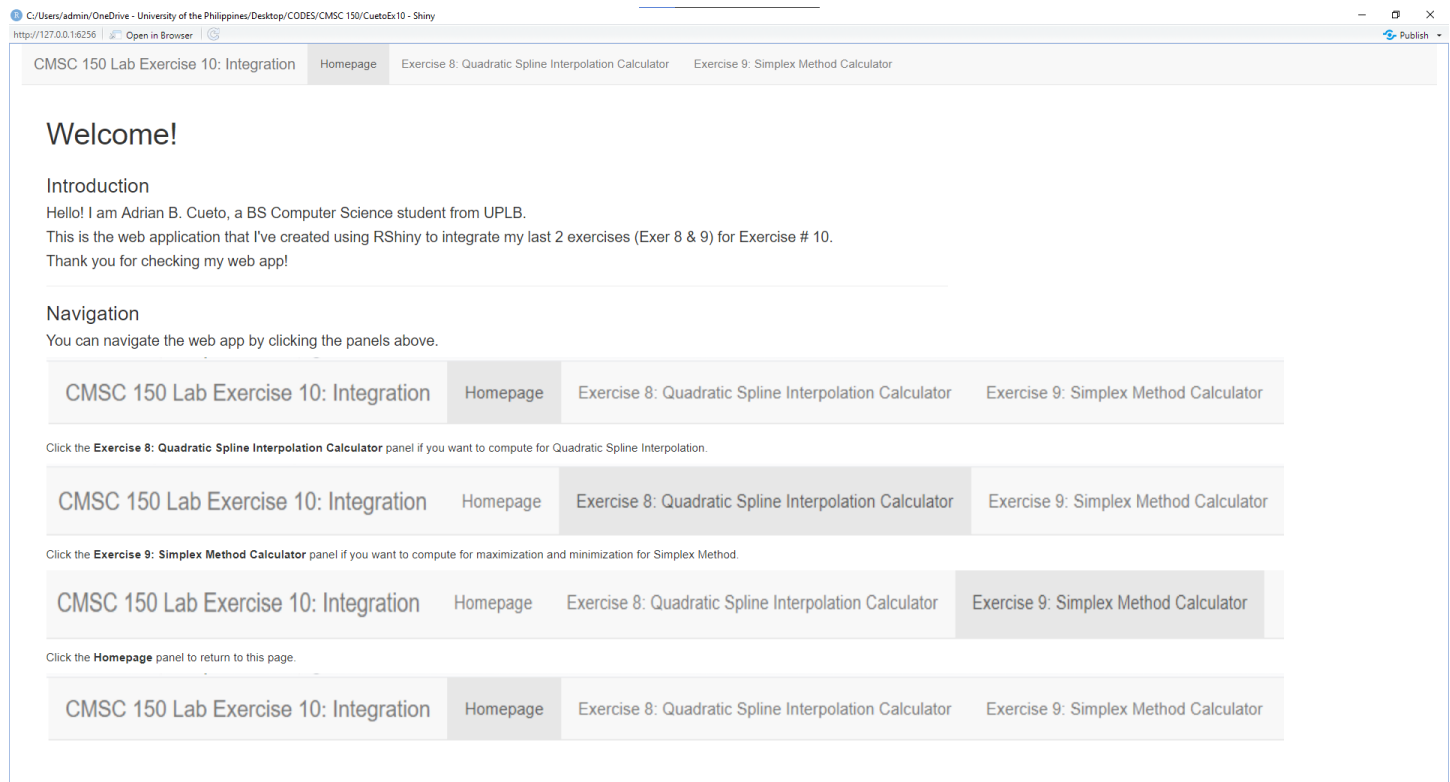
Option 2: Enter these codes in the *Console*

```
> library(shiny)
```

```
> runApp()
```



A window will then open and display the homepage of the web app



Navigating and Operating the Application

This web app contains 3 pages that can be navigated through the “Navigation Panel”

1. Homepage – the main page of the application

The screenshot shows a web browser window with the address bar displaying `http://127.0.0.1:6256`. The page title is "CMSC 150 Lab Exercise 10: Integration". The navigation panel at the top contains four items: "CMSC 150 Lab Exercise 10: Integration", "Homepage", "Exercise 8: Quadratic Spline Interpolation Calculator", and "Exercise 9: Simplex Method Calculator". The main content area has a "Welcome!" heading, an "Introduction" section with a greeting from Adrian B. Cueto, and a "Navigation" section with instructions on how to use the application. Below the navigation section, there are three panels, each with a navigation bar and a main content area. The first panel is for "Exercise 8: Quadratic Spline Interpolation Calculator", the second for "Exercise 9: Simplex Method Calculator", and the third for "Homepage". Each panel has a navigation bar with the same four items as the top panel, and a main content area with instructions on how to use the application.

CMSC 150 Lab Exercise 10: Integration

Welcome!

Introduction

Hello! I am Adrian B. Cueto, a BS Computer Science student from UPLB.
This is the web application that I've created using RShiny to integrate my last 2 exercises (Exer 8 & 9) for Exercise # 10.
Thank you for checking my web app!

Navigation

You can navigate the web app by clicking the panels above.

CMSC 150 Lab Exercise 10: Integration

Click the **Exercise 8: Quadratic Spline Interpolation Calculator** panel if you want to compute for Quadratic Spline Interpolation.

CMSC 150 Lab Exercise 10: Integration

Click the **Exercise 9: Simplex Method Calculator** panel if you want to compute for maximization and minimization for Simplex Method.

CMSC 150 Lab Exercise 10: Integration

Click the **Homepage** panel to return to this page.

CMSC 150 Lab Exercise 10: Integration

2. Quadratic Spline Interpolation Calculator – integrates the Exercise 8 into the application

The screenshot shows the "Quadratic Spline Interpolation Calculator" page. The navigation panel at the top is the same as the homepage. The main content area has a heading "Quadratic Spline Interpolation Calculator" and an "Instructions" section. The instructions section contains text about input values, a note about the number of values, and a "Calculate" button. Below the instructions, there are three input fields: "Input Values:", "Functions Gathered per interval:", and "Estimated y value for x input:". The "Input Values:" field has a text input with the value "1,2,3". The "Functions Gathered per interval:" field has a text input with the value "4,0,5,0,6,0". The "Estimated y value for x input:" field has a text input with the value "1".

CMSC 150 Lab Exercise 10: Integration

Quadratic Spline Interpolation Calculator

Instructions

Inputs must be separated by a comma ',' eg. 1,0,2,0,3,0. Also, the length of the values entered in the two variables must be the same
Click the 'Calculate' button once all the values are inputted correctly
NOTE: Enter at least 3 values for each variable.

Enter x values (independent variables)

eg. 1,2,3

Enter y values (dependent variables)

eg. 4,0,5,0,6,0

Enter x value to be approximated (Must be in the range of the given x values)

1

Calculate

Input Values:

Functions Gathered per interval:

Estimated y value for x input:

- a. Instructions for using the QSI calculator:
 - i. Enter the x and y values in their respective input bars (each value should be separated by a comma). Also, input the x value to be approximated

Instructions

Inputs must be separated by a comma ',' eg. 1.0,2.0,3.0. Also, the length of the values entered in the two variables must be the same

Click the 'Calculate' button once all the values are inputted correctly

NOTE: Enter at least 3 values for each variable.

Enter x values (independent variables)

eg. 1,2,3

Enter y values (dependent variables)

eg. 4.0,5.0,6.0

Enter x value to be approximated (Must be in the range of the given x values)

1

Calculate

Instructions

Inputs must be separated by a comma ',' eg. 1.0,2.0,3.0. Also, the length of the values entered in the two variables must be the same

Click the 'Calculate' button once all the values are inputted correctly

NOTE: Enter at least 3 values for each variable.

Enter x values (independent variables)

3.0,4.5,7.0,9.0

Enter y values (dependent variables)

2.5,1.0,2.5,0.5

Enter x value to be approximated (Must be in the range of the given x values)

5

Calculate

- ii. Click the “Calculate” button to calculate for the QSI. The results will be shown on the right side of the screen

C:\Users\admin\OneDrive - University of the Philippines\Desktop\CODES\CMSC 150\CuetoEx10 - Shiny
http://127.0.0.1:6256 | Open in Browser

CMSC 150 Lab Exercise 10: Integration | Homepage | Exercise 8: Quadratic Spline Interpolation Calculator | Exercise 9: Simplex Method Calculator

Quadratic Spline Interpolation Calculator

Instructions

Inputs must be separated by a comma ',' eg. 1.0,2.0,3.0. Also, the length of the values entered in the two variables must be the same

Click the 'Calculate' button once all the values are inputted correctly

NOTE: Enter at least 3 values for each variable.

Enter x values (independent variables)

3.0,4.5,7.0,9.0

Enter y values (dependent variables)

2.5,1.0,2.5,0.5

Enter x value to be approximated (Must be in the range of the given x values)

5

Calculate

Input Values:

\$x_values
[1] 3.0 4.5 7.0 9.0

\$y_values
[1] 2.5 1.0 2.5 0.5

[1] "Approximate x = 5"

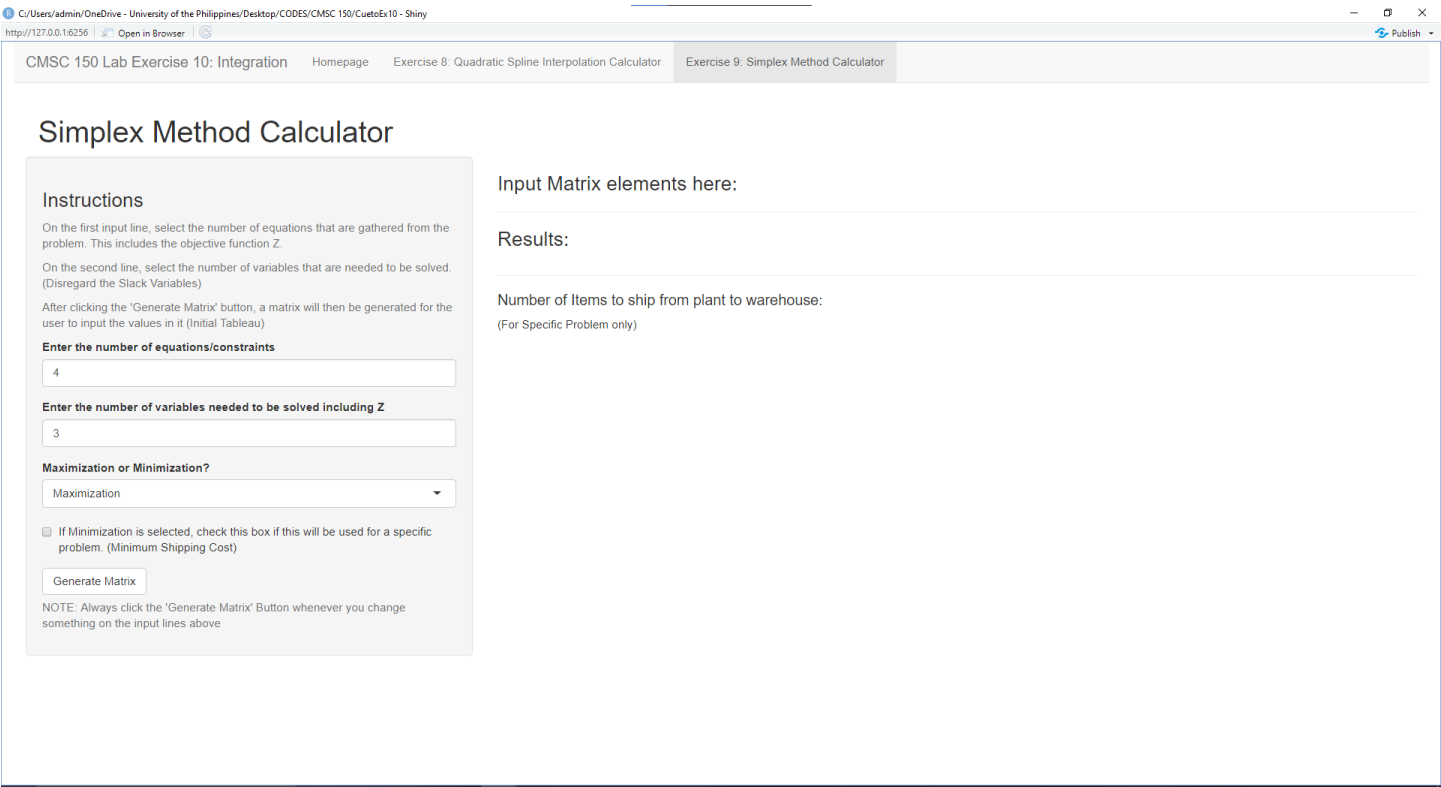
Functions Gathered per interval:

```
[[1]]  
function (x) 0 * x^2 + -1 * x + 5.5  
<environment: 0x00000121544b34a8>  
  
[[2]]  
function (x) 0.6400000000000001 * x^2 + -6.760000000000001 * x + 18.46  
<environment: 0x00000121544b34a8>  
  
[[3]]  
function (x) -1.6 * x^2 + 24.6 * x + -91.30000000000001  
<environment: 0x00000121544b34a8>
```

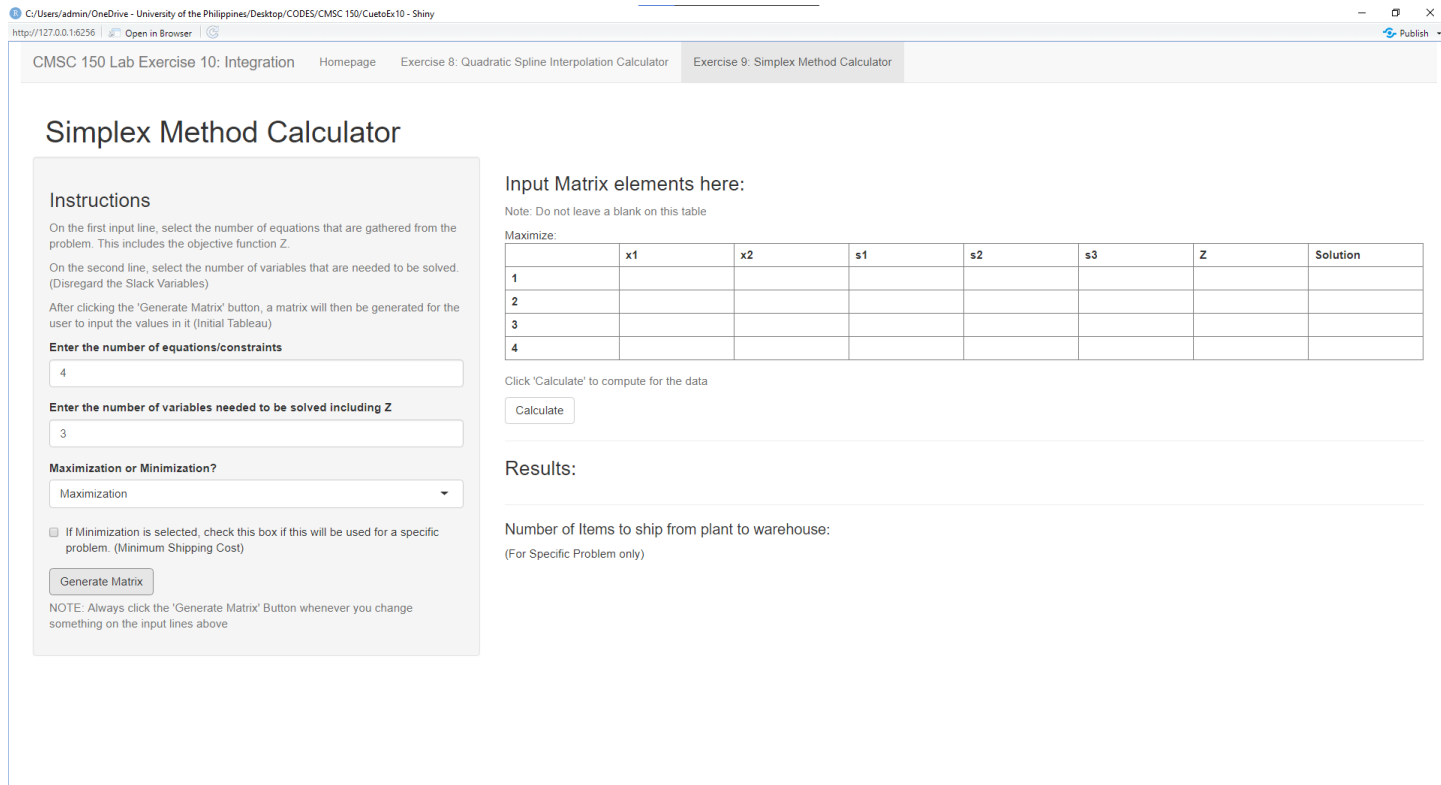
Estimated y value for x input:

[1] 0.66

3. Simplex Method Calculator – integrates the Exercise 9 into the application



- a. Instructions for running:
- i. Input the number of constraints and objective function, then input the number of unknowns including the variable to be maximized (Z).
 - ii. After inputting the values, choose between maximization and minimization, then select the checkbox if the *shipping.num* will be returned in the results.
 - iii. Lastly, click the “Generate Matrix” to generate a blank matrix and display it to the UI.



(for maximization)

(for minimization)

C:/Users/admin/OneDrive - University of the Philippines/Desktop/CODES/CMSC 150/CuetoEx10 - Shiny
http://127.0.0.1:6256 | Open in Browser

CMSC 150 Lab Exercise 10: Integration Homepage Exercise 8: Quadratic Spline Interpolation Calculator Exercise 9: Simplex Method Calculator Publish

Simplex Method Calculator

Instructions

On the first input line, select the number of equations that are gathered from the problem. This includes the objective function Z.

On the second line, select the number of variables that are needed to be solved (Disregard the Slack Variables)

After clicking the "Generate Matrix" button, a matrix will then be generated for the user to input the values in it (Initial Tableau)

Enter the number of equations/constraints

9

Enter the number of variables needed to be solved including Z

16

Maximization or Minimization?

Minimization

☒ If Minimization is selected, check this box if this will be used for a specific problem. (Minimum Shipping Cost)

Generate Matrix

NOTE: Always click the "Generate Matrix" Button whenever you change something on the input lines above

Input Matrix elements here:

Note: Do not leave a blank on this table

Minimize:

	x1	x2	x3	x4	x5	x6	x7	x8	x9	x10	x11	x12	x13	x14	x15	RHS
1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	0	0	0	-310
2	0	0	0	0	0	-1	-1	-1	-1	-1	0	0	0	0	0	-260
3	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-280
4	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	180
5	0	1	0	0	0	0	1	0	0	0	0	1	0	0	0	80
6	0	0	1	0	0	0	0	1	0	0	0	0	1	0	0	200
7	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0	160
8	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1	220
9	10	8	6	5	4	6	5	4	3	6	3	4	5	5	9	1

Click "Calculate" to compute for the data

Calculate

Results:

```
$final.tableau
s1 s2 s3 s4 s5 s6 s7 s8 x1 x2 x3 x4 x5 x6 x7 x8 x9 x10 x11 x12 x13 x14 x15 z Solution
x1 0 0 0 0 0 0 0 0 1 0 -1 0 0 0 0 0 0 -1 0 1 0 0 0 6
x2 0 0 0 0 0 0 0 0 0 1 -1 0 0 0 0 0 0 0 -1 1 0 0 0 3
x3 -1 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 -1 0 0 0 1
x4 0 0 0 0 0 0 0 0 0 0 -1 1 0 0 0 1 -1 0 0 0 0 0 0 0
x5 -1 0 0 0 0 0 0 1 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 4
x6 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 -1 0 0 -1 0 1 0 0 4
x7 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 -1 0 0 0 -1 1 0 0 2
x8 -1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 6
x9 -1 0 0 0 0 0 1 0 0 0 1 0 0 0 0 -1 1 0 0 0 0 0 0 5
```

Generate Matrix

NOTE: Always click the 'Generate Matrix' Button whenever you change something on the input lines above

Results:

```
$final.tableau
s1 s2 s3 s4 s5 s6 s7 s8 x1 x2 x3 x4 x5 x6 x7 x8 x9 x10 x11 x12 x13 x14 x15 Z Solution
x1 0 0 0 0 0 0 0 0 1 0 -1 0 0 0 0 0 0 0 -1 0 1 0 0 0 6
x2 0 0 0 0 0 0 0 0 0 0 1 -1 0 0 0 0 0 0 0 0 -1 1 0 0 0 3
x3 -1 0 1 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 -1 0 0 0 1
x4 0 0 0 0 0 0 0 0 0 0 -1 1 0 0 0 1 -1 0 0 0 0 0 0 0 0 0
x5 -1 0 0 0 0 0 0 1 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 4
x6 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 -1 0 0 -1 0 1 0 0 0 4
x7 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 -1 0 0 -1 1 0 0 0 2
x8 -1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 6
x9 -1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 -1 1 0 0 0 0 0 0 0 5
x10 0 0 0 0 0 0 0 0 0 0 1 0 -1 0 0 -1 0 1 0 0 0 0 0 0 4
x11 -1 0 0 1 0 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0 -1 0 0 0 4
x12 -1 0 0 0 1 0 0 0 0 0 1 0 0 0 0 0 0 0 0 1 -1 0 0 0 5
x13 -1 1 0 0 0 0 0 0 0 0 1 0 0 0 0 0 -1 0 0 0 0 0 0 0 2
x14 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 -1 0 0 0 -1 1 0 0 1
x15 0 0 0 0 0 0 0 0 0 0 0 1 0 -1 0 0 0 0 0 0 -1 0 1 0 6
RHS 10 0 0 0 0 0 0 0 0 0 0 80 0 220 0 0 100 160 0 180 80 20 0 0 1 3200

$basic.solution
s1 s2 s3 s4 s5 s6 s7 s8 x1 x2 x3 x4 x5 x6 x7 x8 x9 x10 x11 x12
10 0 0 0 0 0 0 0 0 0 0 80 0 220 0 0 100 160 0 180 80
x13 x14 x15 Z
20 0 0 3200

$opt.val
[1] 3200

$shipping.num
SAC SL ALB CHI NYC
DEN 0 0 80 0 220
PHO 0 0 100 160 0
DAL 180 80 20 0 0
```

Number of Items to ship from plant to warehouse:

(For Specific Problem only)

	SAC	SL	ALB	CHI	NYC
DEN	0.00	0.00	80.00	0.00	220.00
PHO	0.00	0.00	100.00	160.00	0.00
DAL	180.00	80.00	20.00	0.00	0.00

Note: The table in the bottom will only be displayed if the checkbox in the input is selected

Contact Information

If there are any concerns or issues in the application, you can contact me in my e-mail: abcueto1@up.edu.ph