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CMSC 150 X2L
Exercise 10

Files needed:

1. ResuelloEx08.R
2. Resuello09.R

Import for R Shiny

1. R Shiny
2. R Shiny Themes
3. R Shiny Matrix

How to run app?

1. Install the needed packages
2. Click Run App

User interface when the app is run.

The screenshot shows a web browser window displaying a Shiny application. The browser's address bar shows the URL `http://127.0.0.1:7230` and a tab labeled "Open in Browser". The application has a navigation bar with four tabs: "Exercise 10" (selected), "Quadratic Spline Interpolation", "Simplex Method", and "Shipping Problem". The main content area is titled "Quadratic Spline Interpolation Calculator". It features an "Input:" section with a table for data entry:

x	f(x)

Below the table, there is a note: "Leave last row empty if no inputs left." and a text input field labeled "Value to be approximated:" with the value "0" entered. A "Submit" button is located below the input field. To the right of the input section, there are two labels: "Polynomial Functions" and "Estimated Value". The browser window also shows a "Publish" button in the top right corner.

Navigation Panels

The three panels are Quadratic Spline Interpolation, Simplex Method, and Shipping Problem panels. When clicked, the specific calculator or page is shown.

This is a partial screenshot of the same Shiny application interface. It shows the navigation bar with the tabs "Exercise 10", "Quadratic Spline Interpolation", "Simplex Method", and "Shipping Problem". Below the navigation bar, the beginning of the "Quadratic Spline Interpolation Calculator" section is visible, showing the "Polynomial Functions" label.

Quadratic Spline Interpolation Panel

In the sidebar panel, enter the value to be estimated and the x and y numbers. A new row will automatically generate once all the existing rows are filled. If no inputs left, just leave the row empty.

Once all inputs are inputted, click the Submit button to perform the necessary calculation and show the output. The output will be shown in the main panel.

http://127.0.0.1:7230

Open in Browser

Publish

Exercise 10

Quadratic Spline Interpolation

Simplex Method

Shipping Problem

Quadratic Spline Interpolation Calculator

Input:

x	f(x)
3.0	2.5
4.5	1.0
7.0	2.5
9.0	0.5

Leave last row empty if no inputs left

Value to be approximated:

5

Submit

Polynomial Functions

Polynomials per interval

[[1]]

function(x) 0 * x^2 + -0.9997 * x^1 + 5.4991

<environment: 0x7f7ebf106578>

[[2]]

function(x) 0.6427 * x^2 + -6.7856 * x^1 + 18.5145

<environment: 0x7f7ebf106578>

Estimated Value

0.654

Simplex Method Panel

When the Simplex Method panel is clicked, you will see the simplex method calculator page.

Simplex Method Calculator

Method: maximize

Initial Tableau:

colName	colName	colName	colName

Leave last row and column empty if no inputs left

Submit

Output:

Final Tableau
Basic Solution
Optimal Value

Choose the method you want to perform by clicking the dropdown box.

Simplex Method Calculator

Method: maximize

maximize
minimize

colName	colName

Input the numeric values in the matrix. Change the column names with the needed variables or names. The rows and column will automatically generate once all existing rows or columns are filled. If no inputs left, leave the last row and column empty. Once the submit button is clicked, the outputs—final tableau, basic solution, and optimal value will be shown below the submit button.

Simplex Method Maximization Sample Run

<http://127.0.0.1:7153> [Open in Browser](#) [Publish](#)

Method:

maximize

Initial Tableau:

x1	x2	s1	s2	s3	s4	z	solution	
7	11	1	0	0	0	0	77	
10	8	0	1	0	0	0	80	
1	0	0	0	1	0	0	9	
0	1	0	0	0	1	0	6	
-150	-175	0	0	0	0	1	0	

Leave last row and column empty if no inputs left

Submit

Output:

Final Tableau

x1	x2	s1	s2	s3	s4	z	solution
1.00	0.00	-0.15	0.20	0.00	0.00	0.00	4.89
0.00	0.00	-0.19	0.13	0.00	1.00	0.00	2.11
0.00	0.00	0.15	-0.20	1.00	0.00	0.00	4.11
0.00	1.00	0.19	-0.13	0.00	0.00	0.00	3.89
0.00	0.00	10.19	7.87	0.00	0.00	1.00	1413.89

Basic Solution

x1	x2	s1	s2	s3	s4	z
4.888889	3.888889	0.000000	0.000000	4.111111	2.111111	1413.888889

Optimal Value

1413.889

Simplex Method Minimization Sample Run

<http://127.0.0.1:7153> [Open in Browser](#) [Publish](#)

Exercise 10 Quadratic Spline Interpolation Simplex Method Shipping Problem

Simplex Method Calculator

Method:

minimize

Initial Tableau:

S1	S2	X1	X2	Z	Solution	
1	7	1	0	0	14	
2	6	0	1	0	20	
-4	-20	0	0	1	0	

Leave last row and column empty if no inputs left

Submit

Output:

Final Tableau

S1	S2	X1	X2	Z	Solution
0.00	1.00	0.25	-0.12	0.00	1.00
1.00	0.00	-0.75	0.88	0.00	7.00
0.00	0.00	2.00	1.00	1.00	48.00

Basic Solution

S1	S2	X1	X2	Z
0	0	2	1	48

Optimal Value

48

When the Shipping Problem panel is clicked, you will see the page for minimizing the shipping cost calculator.

Input the numeric values in the matrix. The rows and column will automatically generate once all existing rows or columns are filled. If no inputs left, leave the last row and column empty. Once the submit button is clicked, the outputs—final tableau, basic solution, optimal value, and number of shipped items matrix will be shown below the submit button.

Shipping Problem Sample Run

Inputs:

<http://127.0.0.1:7153> [Open in Browser](#) [Publish](#)

Exercise 10 Quadratic Spline Interpolation Simplex Method Shipping Problem

Minimize Shipping Cost

Initial 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
-1	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10
-1	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
-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
-1	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	5
-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
0	-1	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	6
0	-1	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	5
0	-1	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	4
0	-1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	3
0	-1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	6
0	0	-1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	3
0	0	-1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	4
0	0	-1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	5
0	0	-1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	5
0	0	-1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	9
310	260	280	-180	-80	-200	-160	-220	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0

Leave last row and column empty if no inputs left.

Submit

Outputs:

<http://127.0.0.1:7230> [Open in Browser](#) [Publish](#)

Leave last row and column empty if no inputs left.

Submit

Output:

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
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	-1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-1.00	0.00	1.00	0.00	0.00	0.00	6.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	-1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-1.00	1.00	0.00	0.00	0.00	3.00
-1.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-1.00	0.00	0.00	0.00	1.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-1.00	1.00	0.00	0.00	0.00	1.00	-1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	-1.00	0.00	0.00	-1.00	0.00	1.00	0.00	0.00	0.00	4.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	-1.00	0.00	0.00	0.00	-1.00	1.00	0.00	0.00	0.00	2.00
-1.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.00
-1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	-1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	-1.00	0.00	0.00	-1.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	4.00
-1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	-1.00	0.00	0.00	0.00	4.00
-1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	-1.00	0.00	0.00	0.00	5.00
-1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	-1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	-1.00	0.00	0.00	0.00	-1.00	1.00	0.00	0.00	1.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	-1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-1.00	0.00	1.00	0.00	6.00
10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	80.00	0.00	220.00	0.00	0.00	100.00	160.00	0.00	180.00	80.00	20.00	0.00	0.00	1.00	3200.00

Basic Solution

S1	S2	S3	S4	S5	S6	S7	S8	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	Z	
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3200

Optimal Value

3200

Optimal Value

3200

Shipped items matrix

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