

# **USER'S MANUAL**

Prepared By:  
Trixia R. Belleza  
B-5L

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## 1.0 General Information

This system contains two generic solvers: Polynomial Regression and Quadratic Spline Interpolation, and one simplex solver for assessing the value of supply chain management.

## 2.0 Generic Solvers

### 2.1 Polynomial Regression

Step 1. Upload a CSV file.

The format of the csv should be as follows, wherein the first line will contain the column names, the following lines will contain the data points, then at the last datapoint, press enter to create a new line.

```
1 x,y
2 1,5
3 3,-4
4 5,3
5 7,-2
6
```

The screenshot shows a web application interface for Polynomial Regression. On the left is a dark sidebar with the title 'Dashboard' and three menu items: 'Polynomial Regression', 'Quadratic Spline Interpolation', and 'Simplex'. The main content area has a light blue header and a white body. A red rectangular box highlights the 'Choose CSV File' section, which contains a 'Browse...' button, a 'No file selected' status, and a 'Header' checkbox. To the right of this box are two input fields: 'Degree of polynomial' (with a value of 0) and 'Integer input x for f(x)' (with a value of 0). Below the second input field is an 'Enter' button. A white box labeled 'Step 1' is connected by a line to the 'Header' checkbox, indicating the current step in the process.

**Step 2.** Insert the degree of the polynomial and the integer input for the function estimate. Then, press enter to show results.

The screenshot shows a web application interface for polynomial regression. It is divided into several sections:

- Choose CSV File:** Contains a "Browse..." button, a text input field with "polynomial\_regression\_" and a blue "Upload complete" button below it. There is also a checked checkbox labeled "Header".
- Degree of polynomial:** A text input field containing the number "4".
- Integer input x for f(x):** A text input field containing the number "3", with an "Enter" button below it.
- Estimate:** A text input field containing the value "-4".
- Polynomial:** A text area displaying the resulting polynomial function:

```
f <- function(x) 20.17370593
83951 * x**0 + -19.084021382
4519 * x**1 + 3.911321054303
69 * x**2 + 0.03781623795908
02 * x**3 + -0.0388218482057
796 * x**4
```
- Data Table:** A table with two columns, "x" and "y", containing the following data points:

x	y
1	5
3	-4
5	3
7	-2

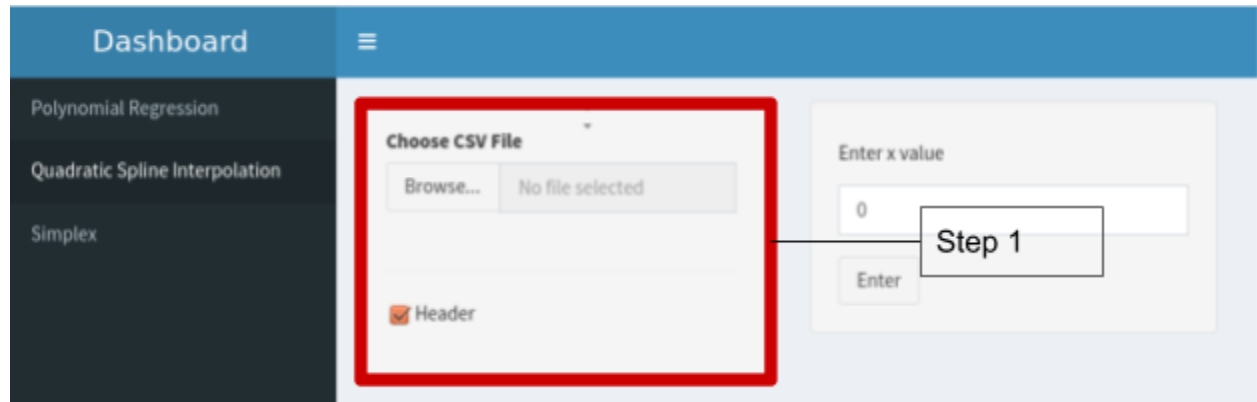
## 2.1 Quadratic Spline Interpolation

**Step 1.** Upload a CSV file.

The format of the csv should be as follows, wherein the first line will contain the column names, the following lines will contain the data points, then at the last datapoint, press enter to create a new line.

The screenshot shows the content of a CSV file with the following lines:

```
1 x,y
2 1,5
3 3,-4
4 5,3
5 7,-2
6
```



Step 2. Insert the x value for quadratic spline. Then, press enter to show results.

Choose CSV File

Browse... qsi\_input.csv

Upload complete

Header

Enter x value

5

Enter

x	y
3.00	2.50
4.50	1.00
7.00	2.50
9.00	0.50

Correct Function

```
f2 <- function(x) 0.6400000000000001x**2 + -6.760000000000001x + 18.46
```

Function Per Interval

**data**

```
f1 <- function(x) -1x + 5.5
```

```
f2 <- function(x) 0.6400000000000001x**2 + -6.760000000000001x + 18.46
```

```
f3 <- function(x) -1.6x**2 + 24.6x + -91.30000000000001
```

### 3.0 Simplex

Step 1. Insert the values on the spreadsheet provided.

Polynomial Regression

Quadratic Spline Interpolation

Simplex

Enter

Show Iterations

Shipping costs from plant to warehouse:

	plants	supply	Sacramento_California	SaltLakeCity_Utah	Albuquerque_NewMexico	Chicago_Illinois	NewYorkCity
1	Denver	310.00	10.00	8.00	6.00	5.00	4.00
2	Phoenix	260.00	6.00	5.00	4.00	3.00	6.00
3	Dallas	280.00	3.00	4.00	5.00	5.00	9.00
4	Shipping Cost	0.00	19.00	17.00	15.00	13.00	19.00
5	Demands By:	0.00	180.00	80.00	200.00	160.00	220.00

Step 2. Click “Enter” to save changes. An output of the optimized number to ship from plant to warehouse will appear.

Number to ship from plant to warehouse:

Plants	Total	Sacramento,California	Salt Lake City, Utah	Albuquerque, New Mexico	Chicago, Illinois	New York City, New York
Denver	300	0	0	0	80	220
Phoenix	260	0	0	180	80	0
Dallas	280	180	80	20	0	0
Totals		180	80	200	160	220

Enter

Show Iterations

Shipping costs from plant to warehouse:

	plants	supply	Sacramento_California	SaltLakeCity_Utah	Albuquerque_NewMexico	Chicago_Illinois	NewYorkCity
1	Denver	310.00	10.00	8.00	6.00	5.00	4.00
2	Phoenix	260.00	6.00	5.00	4.00	3.00	6.00
3	Dallas	280.00	3.00	4.00	5.00	5.00	9.00
4	Shipping Cost	0.00	19.00	17.00	15.00	13.00	19.00
5	Demands By:	0.00	180.00	80.00	200.00	160.00	220.00

Step 3. If you wish to view the iterations made by the simplex function, click “Show Iterations”. A blank window will appear with a small button “Next”. To show the iterations on that window, click “Next”.

### Simplex Iterations

x1	x2	x3	x4	x5	x6	x7	x8	x9	x10	x11	x12	x13	x14	x15
1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	1	1	1	1	1	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
-1	0	0	0	0	-1	0	0	0	0	-1	0	0	0	0
0	-1	0	0	0	0	-1	0	0	0	0	-1	0	0	0
0	0	-1	0	0	0	0	-1	0	0	0	0	-1	0	0
0	0	0	-1	0	0	0	0	-1	0	0	0	0	0	-1
0	0	0	0	-1	0	0	0	0	-1	0	0	0	0	0
10	8	6	5	4	6	5	4	3	6	3	4	5	5	5

Next

**Step 4.** By clicking “Next”, you will be able to see the following iterations made. This table is scrollable so you can see the other columns.

**Note: Every time you make changes to the spreadsheet, always click “Enter” to save the changes you made.**