solveR

USER MANUAL

DE LEON, Richard Emmanuel D.
CMSC 150 - AB5L

Welcome! solveR is a web application built using R and Shiny that currently contains calculators for Polynomial Regression and Quadratic Spline Interpolation, and a diet solver that gives the optimal cost of a diet needed to meet nutritional constraints. This is submitted as the final project for CMSC 150 - Numerical and Symbolic Computation.

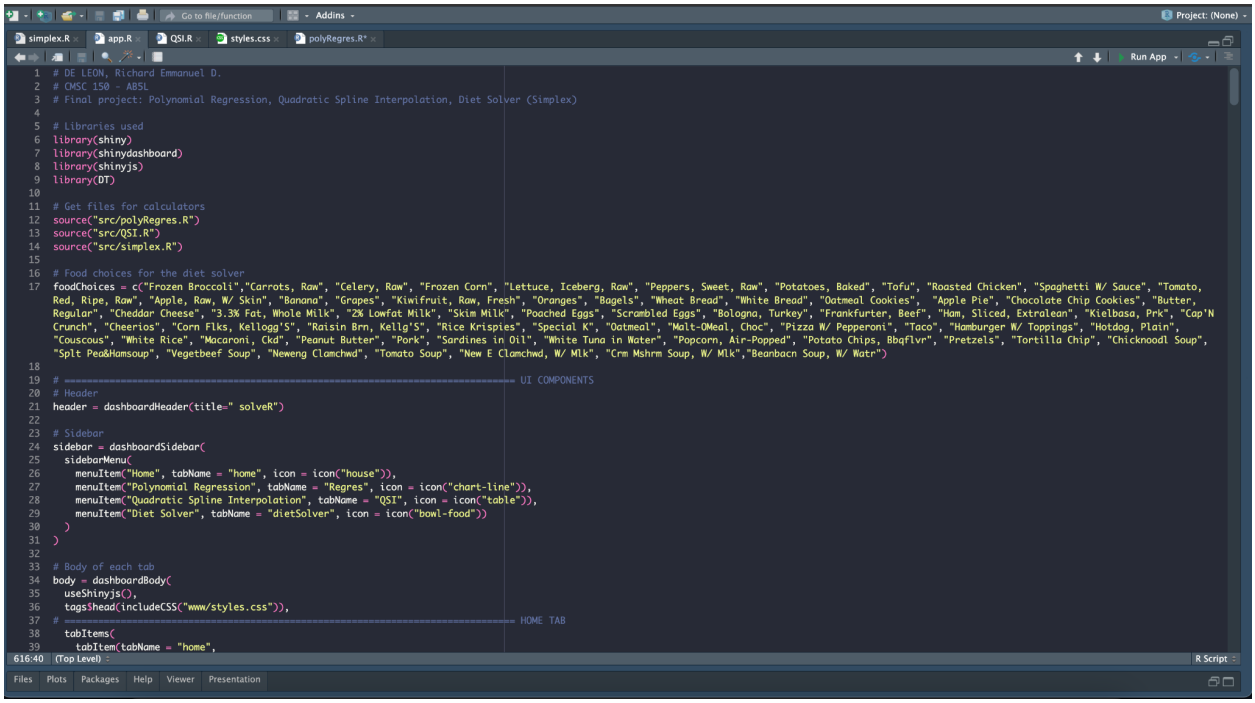
Requirements:

1.) Install R and R Studio
2.) Install dependencies
    a.) install.packages(“shiny”)
    b.) install.packages(“shinydashboard”)
    c.) install.packages(“shinyjs”)
    d.) install.packages(“DT”)

Table of Contents:

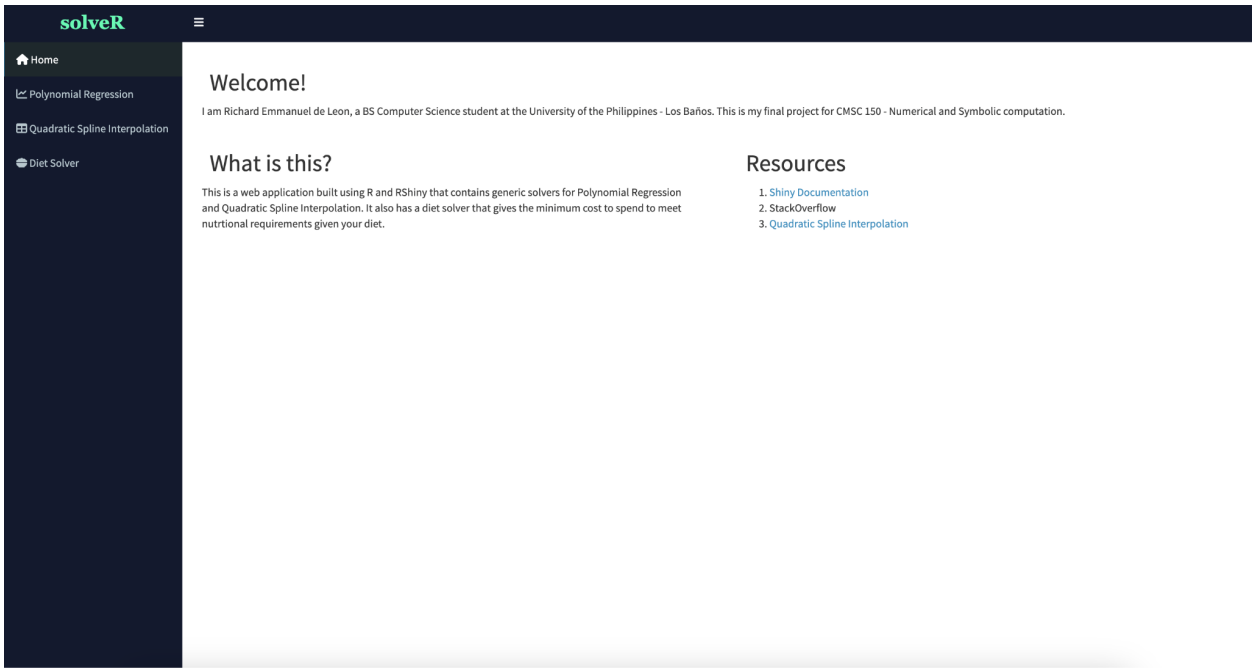
Launching the Application

1.) To start the application, open app.R and click run app.



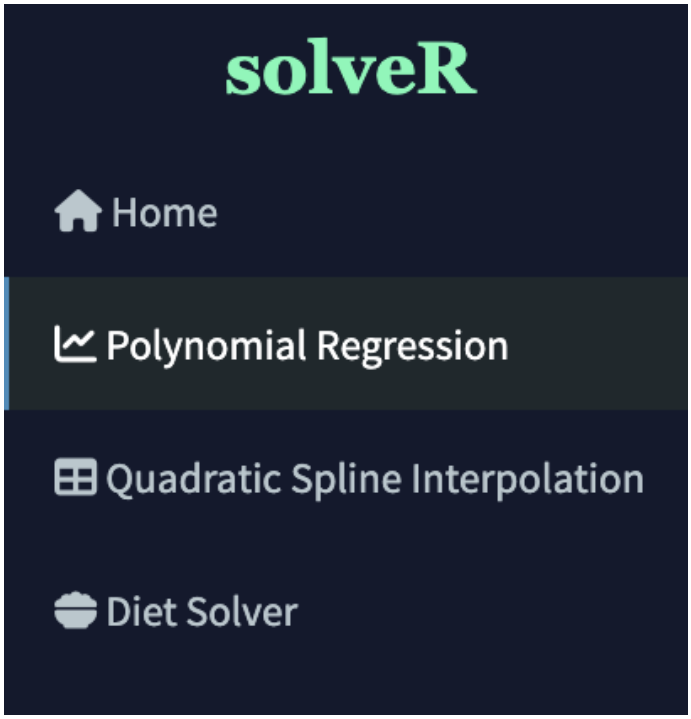
```r
# DE LEON, Richard Emmanuel D.
# CMSC 150 - ABSL
# Final project: Polynomial Regression, Quadratic Spline Interpolation, Diet Solver (Simplex)

# Libraries used
library(shiny)
library(shinydashboard)
library(shinyjs)
library(DT)

# Get files for calculators
source("src/polyRegres.R")
source("src/QSI.R")
source("src/simplex.R")

# Food choices for the diet solver
foodChoices = c("Frozen Broccoli","Carrots, Raw", "Celery, Raw", "Frozen Corn", "Lettuce, Iceberg, Raw", "Peppers, Sweet, Raw", "Potatoes, Baked", "Tofu", "Roasted Chicken", "Spaghetti W/ Sauce", "Tomato, Red, Ripe, Raw", "Apple, Raw, W/ Skin", "Banana", "Grapes", "Kiwifruit, Raw, Fresh", "Oranges", "Bagels", "Wheat Bread", "White Bread", "Oatmeal Cookies", "Apple Pie", "Chocolate Chip Cookies", "Butter, Regular", "Cheddar Cheese", "3.3% Fat, Whole Milk", "2% Lowfat Milk", "Skim Milk", "Poached Eggs", "Scrambled Eggs", "Bologna, Turkey", "Frankfurter, Beef", "Ham, Sliced, Extralean", "Kielbasa, Prk", "Cap'N Crunch", "Cheerios", "Corn Flks, Kellogg'S", "Raisin Brn, Kellg'S", "Rice Krispies", "Special K", "Oatmeal", "Malt-OMeal, Choc", "Pizza W/ Pepperoni", "Taco", "Hamburger W/ Toppings", "Hotdog, Plain", "Couscous", "White Rice", "Macaroni, Ckd", "Peanut Butter", "Pork", "Sardines in Oil", "White Tuna in Water", "Popcorn, Air-Popped", "Potato Chips, Bbqflvr", "Pretzels", "Tortilla Chip", "Chicknoodl Soup", "Splt Pea&Hamsoup", "Vegetbeef Soup", "Neweng Clamchwd", "Tomato Soup", "New E Clamchwd, W/ Mlk", "Crm Mshrm Soup, W/ Mlk","Beanbacn Soup, W/ Watr")

# ========================================================================== UI COMPONENTS
# Header
header = dashboardHeader(title=" solveR")

# Sidebar
sidebar = dashboardSidebar(
  sidebarMenu(
    menuItem("Home", tabName = "home", icon = icon("house")),
    menuItem("Polynomial Regression", tabName = "Regres", icon = icon("chart-line")),
    menuItem("Quadratic Spline Interpolation", tabName = "QSI", icon = icon("table")),
    menuItem("Diet Solver", tabName = "dietSolver", icon = icon("bowl-food"))
  )
)

# Body of each tab
body = dashboardBody(
  useShinyjs(),
  tags$head(includeCSS("www/styles.css")),
# ============================================================================ HOME TAB
  tabItems(
    tabItem(tabName = "home",
```

2.) You should see this page if successful:

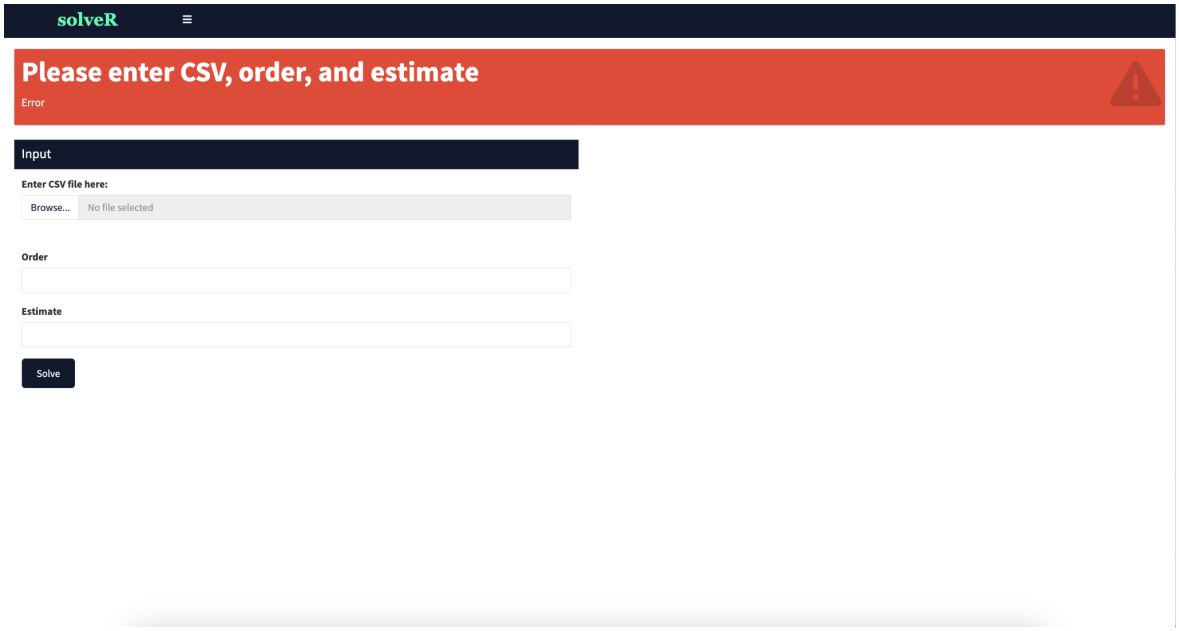


Navigating the Polynomial Regression solver

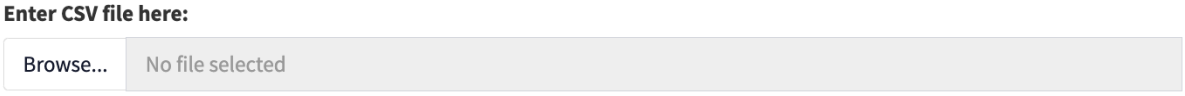
1.) Go to the Polynomial Regression page



2.) You should see this page when you click the tab



3.) Enter your CSV by clicking this button



Enter CSV file here:

Browse... input_Regression.csv

Upload complete

4.) You should see the data points on the top of the page.

Data Points

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
x	100	150	200	250	300	400	500	600	650	700	750	800	850	900	950	1000
y	36	33.8	33	32.4	31.8	30.8	29.3	27.6	26.7	25.8	24.9	24.1	23.4	22.8	21.1	21.4

5.) Enter the order of the polynomial you want to use. (NOTE: You should only put a maximum of n-1 as the order, n = the number of data points).

Order

4

6.) Enter your estimate here.

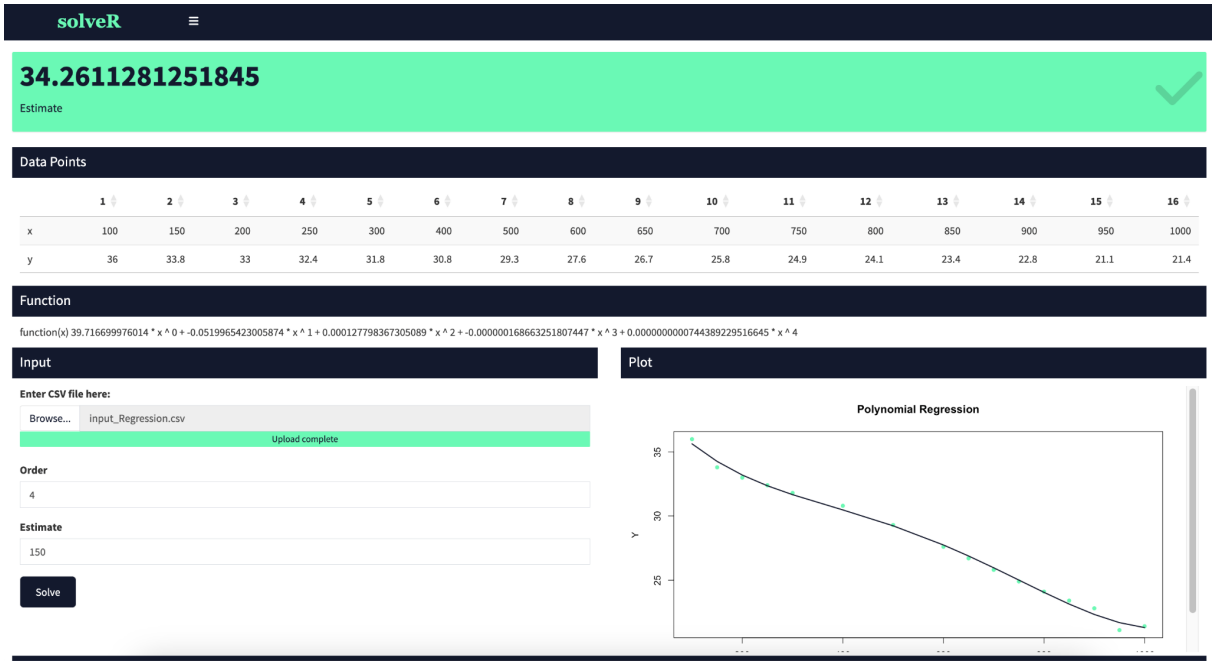
Estimate

150

7.) Click the solve button to solve given your inputs.

Solve

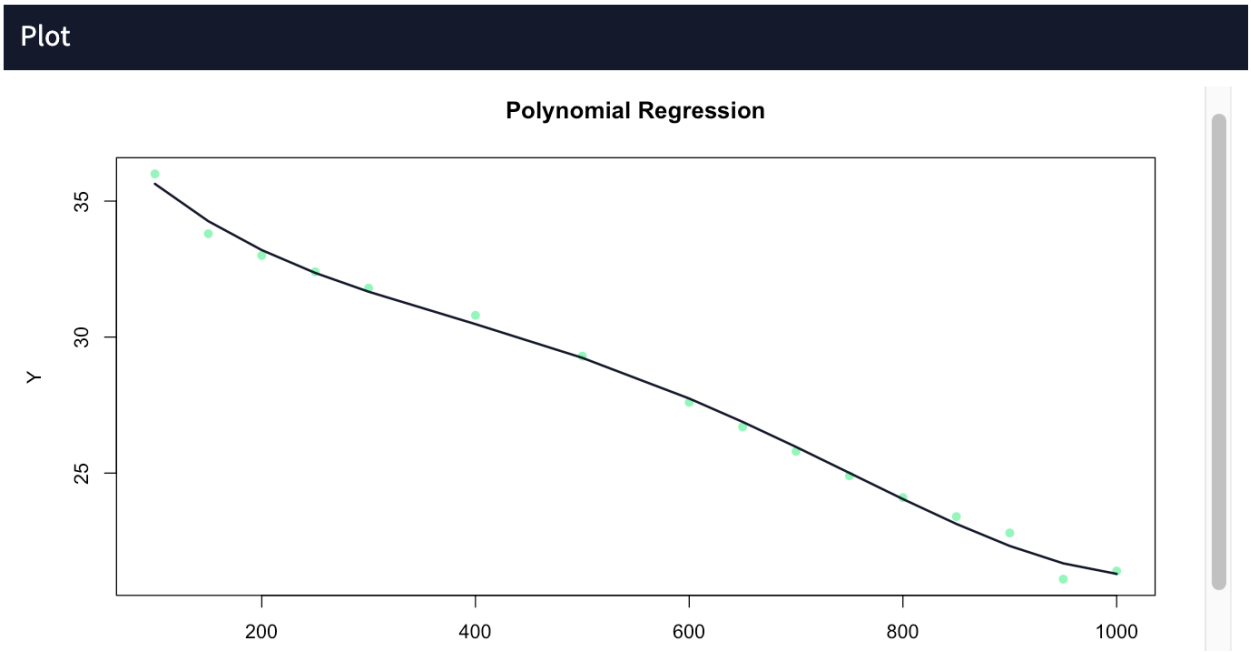
8.) A successful input will result to this page.



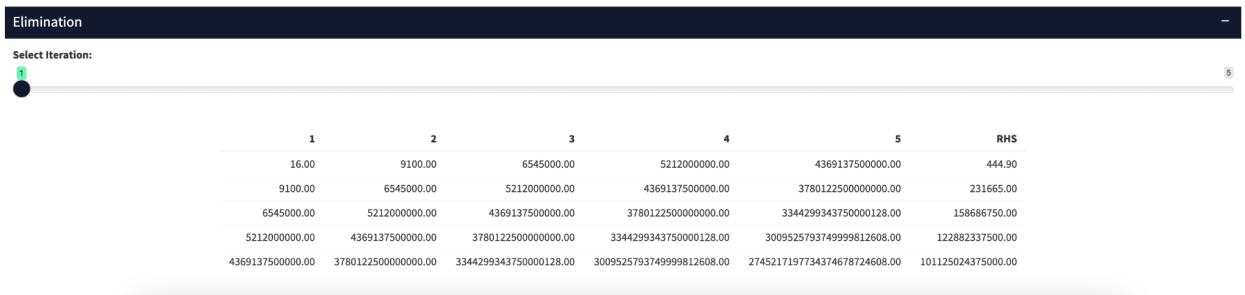
9.) You will see the estimate on top of the page.

10.) Under it is the function string given the order.

11.) To the right of the page is the plot of the function.



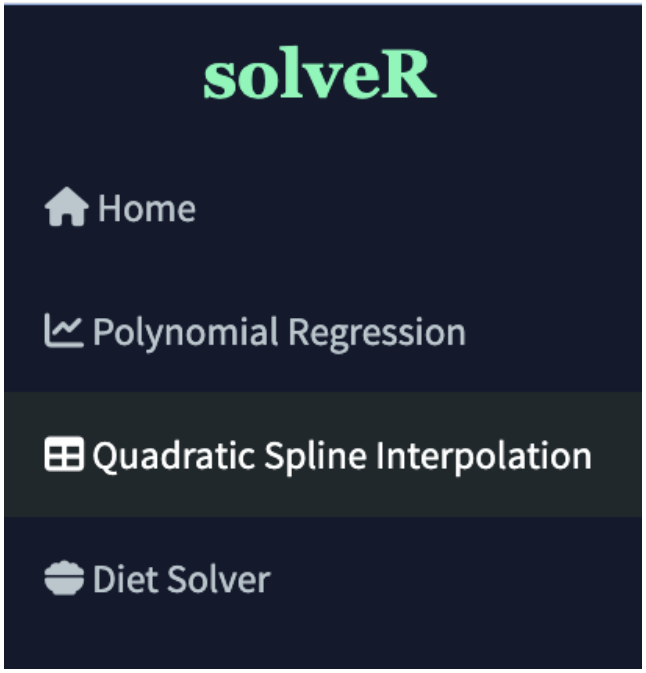
13.) You should see the solution of linear equations on the bottom of the page. Move the slider to check the iterations.



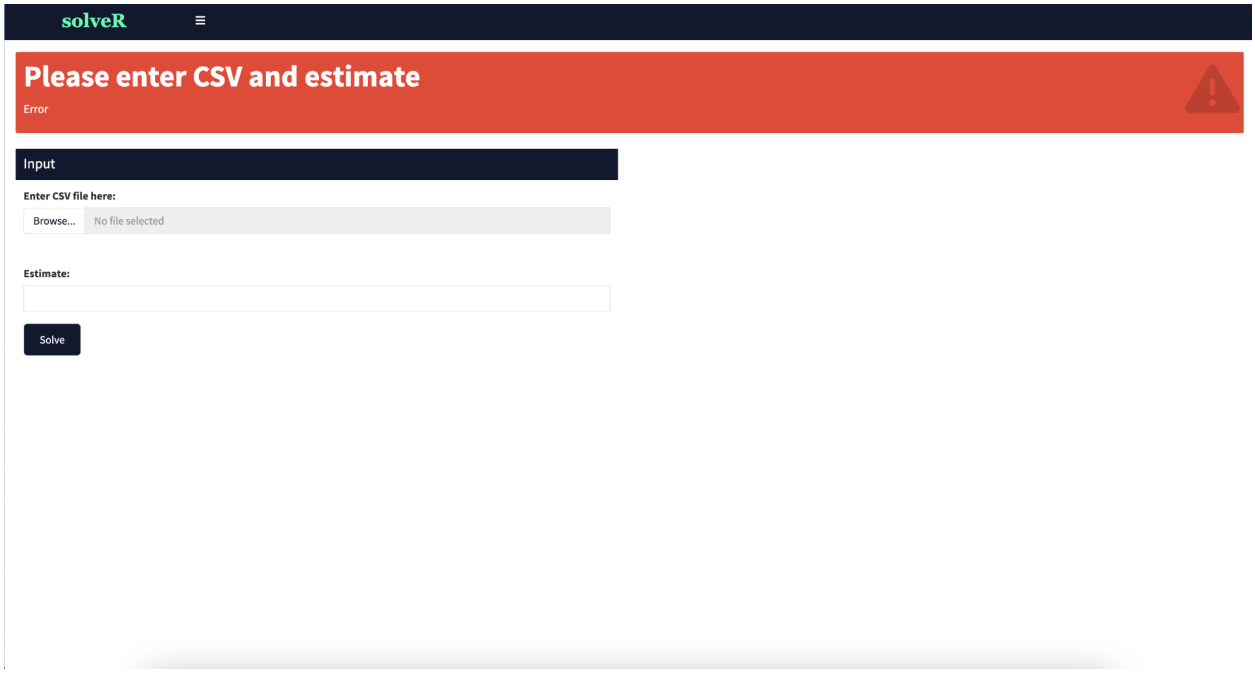
1	2	3	4	5	RHS
16.00	9100.00	6545000.00	5212000000.00	4369137500000.00	444.90
9100.00	6545000.00	5212000000.00	4369137500000.00	3780122500000000.00	231665.00
6545000.00	5212000000.00	4369137500000.00	3780122500000000.00	3344299343750000128.00	158686750.00
5212000000.00	4369137500000.00	3780122500000000.00	3344299343750000128.00	3009525793749999812608.00	122882337500.00
4369137500000.00	3780122500000000.00	3344299343750000128.00	3009525793749999812608.00	2745217197734374678724608.00	101125024375000.00

Navigating the Quadratic Spline Interpolation solver

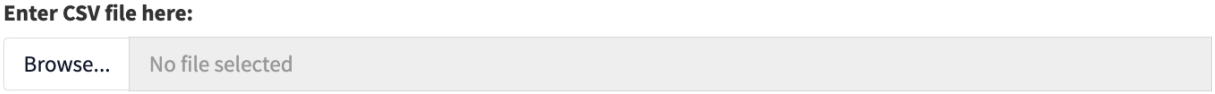
1.) Go to the Quadratic Spline Interpolation page



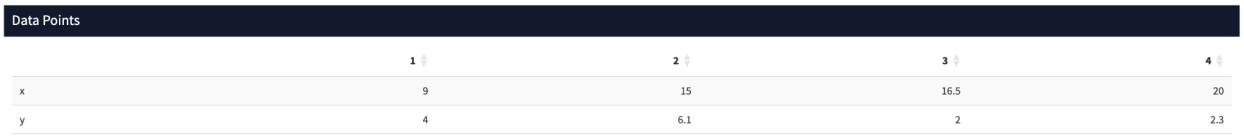
2.) You should see this page upon clicking the tab



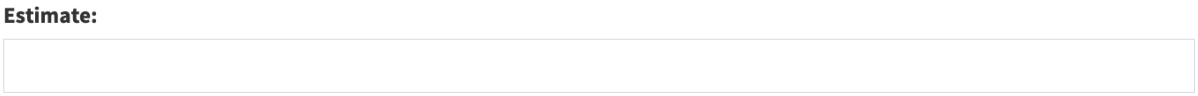
3.) Enter your CSV file here



4.) You should see the list of data points upon entering the file

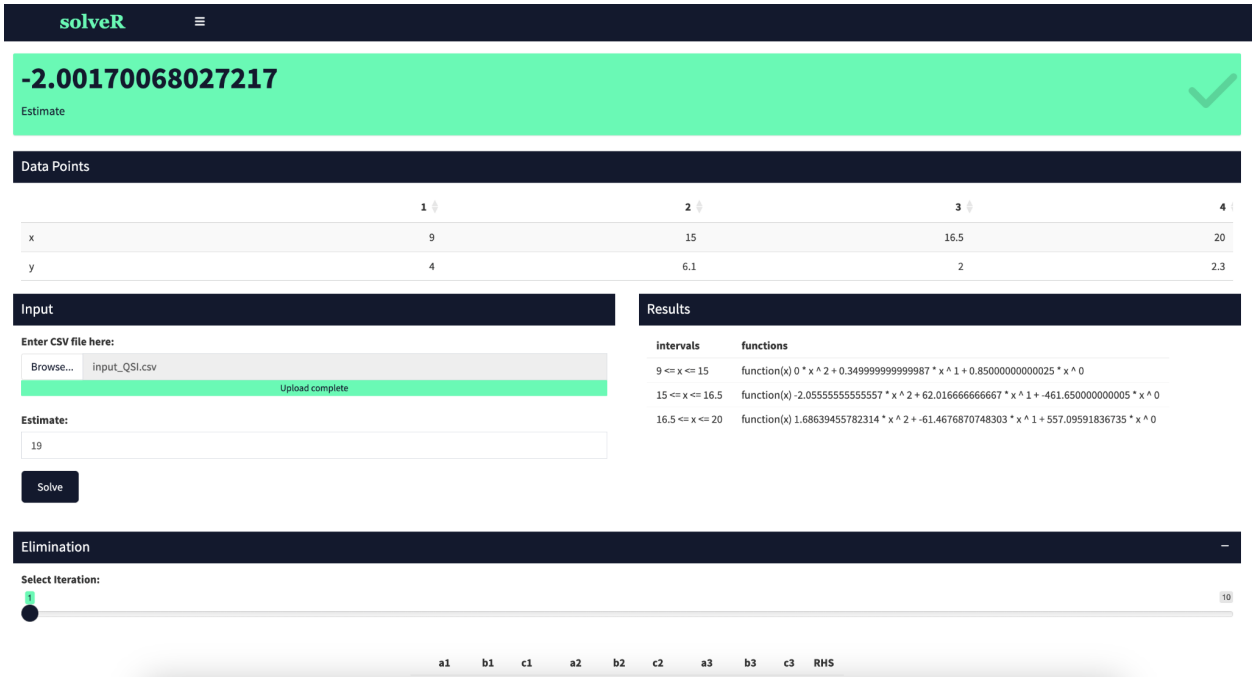


5.) Enter your estimate based on the data points



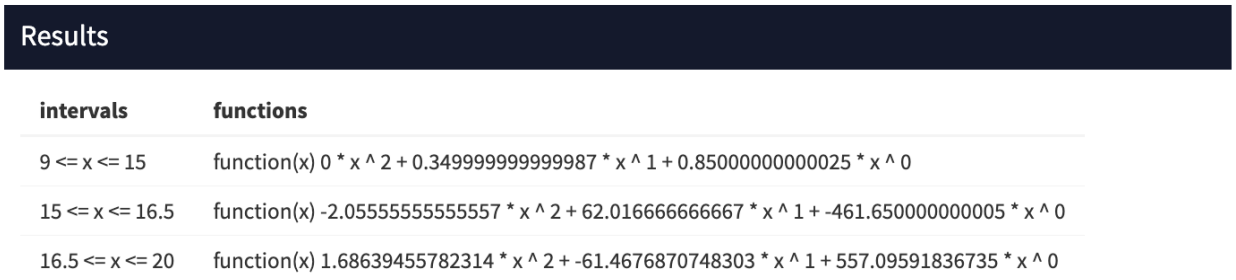
6.) Click the solve button after entering both

7.) After entering valid data, you should see this page



8.) You will see the estimate based on the intervals on the top part of the page

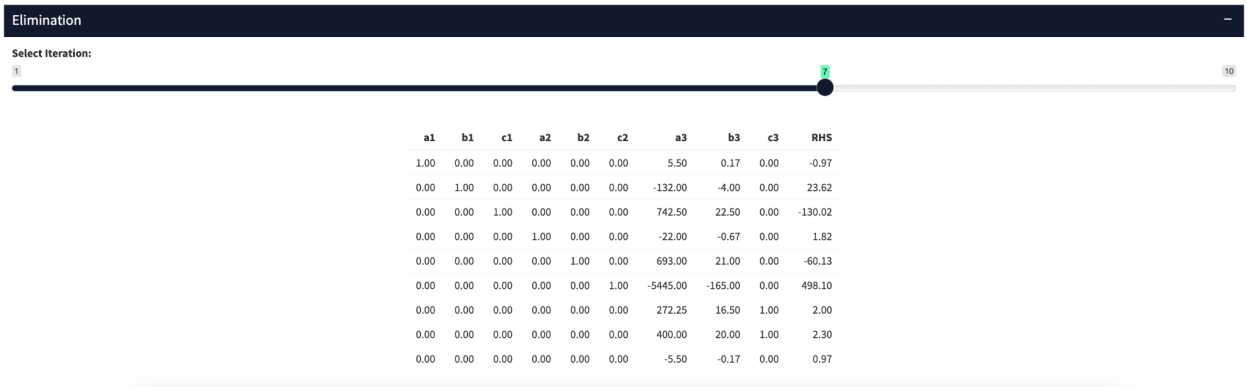
9.) You should see the intervals on the right side of the page



Results

intervals	functions
9 <= x <= 15	function(x) 0 * x ^ 2 + 0.349999999999987 * x ^ 1 + 0.85000000000025 * x ^ 0
15 <= x <= 16.5	function(x) -2.05555555555557 * x ^ 2 + 62.016666666667 * x ^ 1 + -461.650000000005 * x ^ 0
16.5 <= x <= 20	function(x) 1.68639455782314 * x ^ 2 + -61.4676870748303 * x ^ 1 + 557.09591836735 * x ^ 0

10.) You can also see the solution for the system of linear equations on the bottom side of the page. Moving the slider adjusts the iteration number.



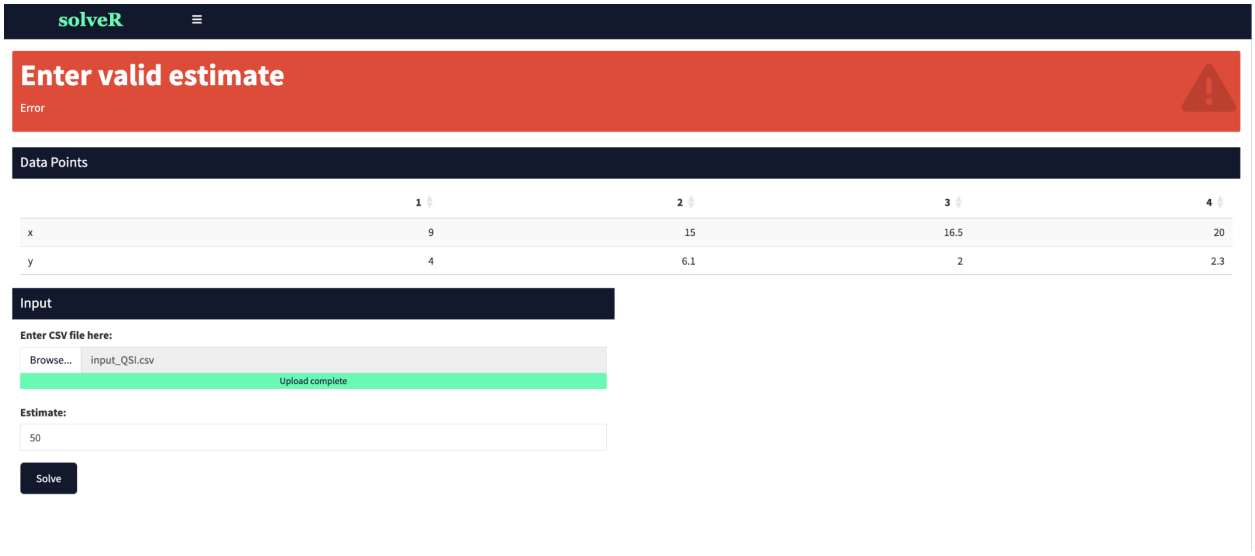
Elimination

Select Iteration:

1 7 10

a1	b1	c1	a2	b2	c2	a3	b3	c3	RHS
1.00	0.00	0.00	0.00	0.00	0.00	5.50	0.17	0.00	-0.97
0.00	1.00	0.00	0.00	0.00	0.00	-132.00	-4.00	0.00	23.62
0.00	0.00	1.00	0.00	0.00	0.00	742.50	22.50	0.00	-130.02
0.00	0.00	0.00	1.00	0.00	0.00	-22.00	-0.67	0.00	1.82
0.00	0.00	0.00	0.00	1.00	0.00	693.00	21.00	0.00	-60.13
0.00	0.00	0.00	0.00	0.00	1.00	-5445.00	-165.00	0.00	498.10
0.00	0.00	0.00	0.00	0.00	0.00	272.25	16.50	1.00	2.00
0.00	0.00	0.00	0.00	0.00	0.00	400.00	20.00	1.00	2.30
0.00	0.00	0.00	0.00	0.00	0.00	-5.50	-0.17	0.00	0.97

11.) An invalid input will show this page. Make sure to check your inputs.



solveR ≡

Enter valid estimate

Error

Data Points

	1	2	3	4
x	9	15	16.5	20
y	4	6.1	2	2.3

Input

Enter CSV file here:

Browse... input_QSI.csv

Upload complete

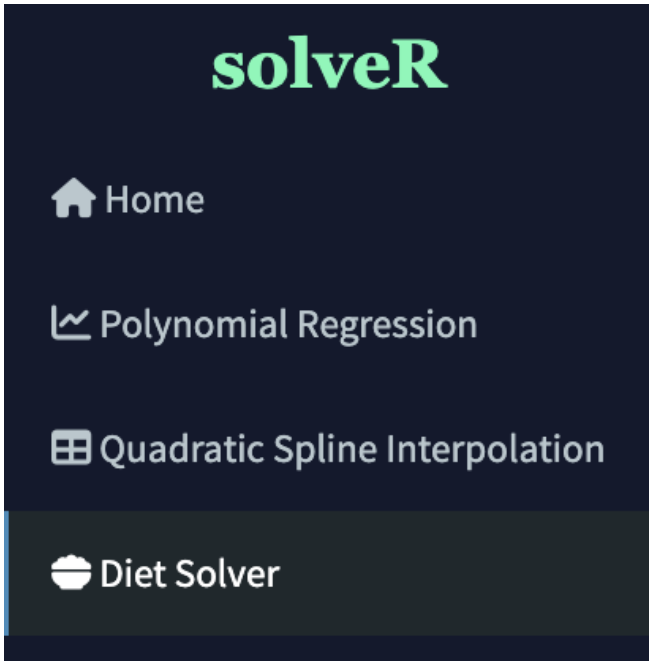
Estimate:

50

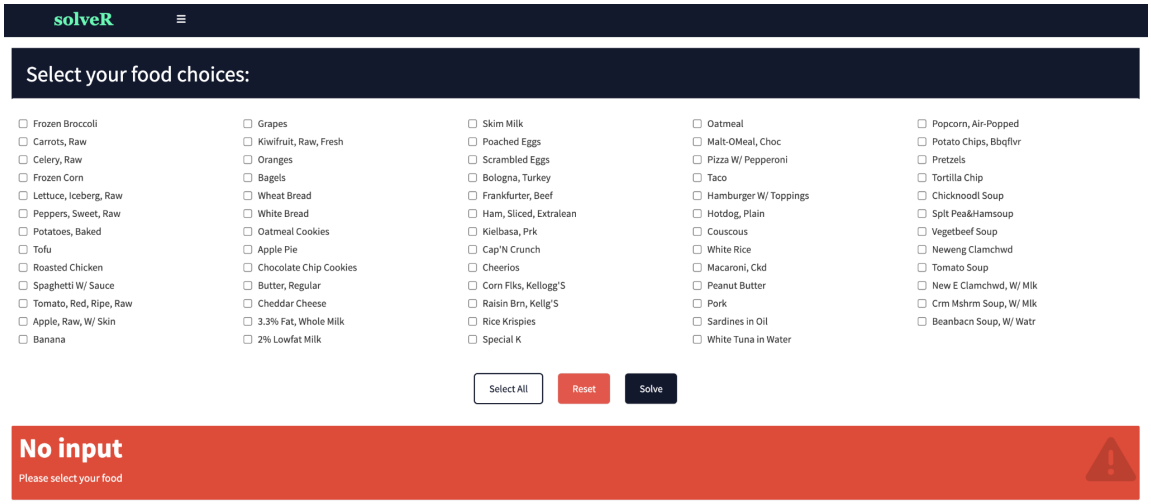
Solve

Navigating the Diet Solver (Simplex)

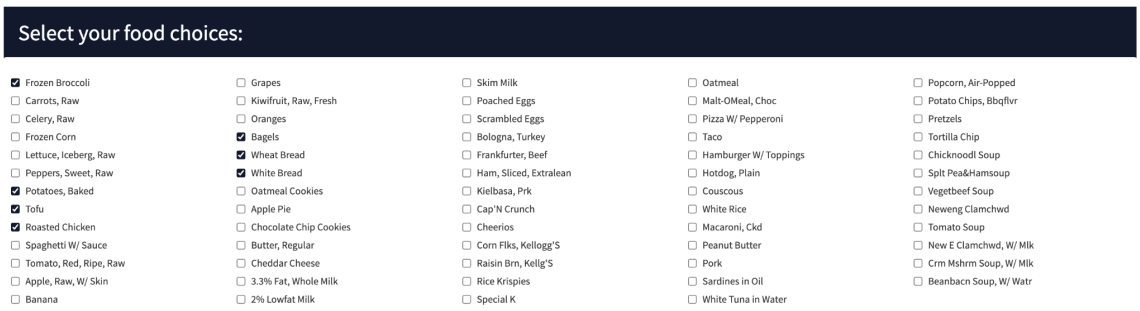
1.) Click the Diet Solver tab



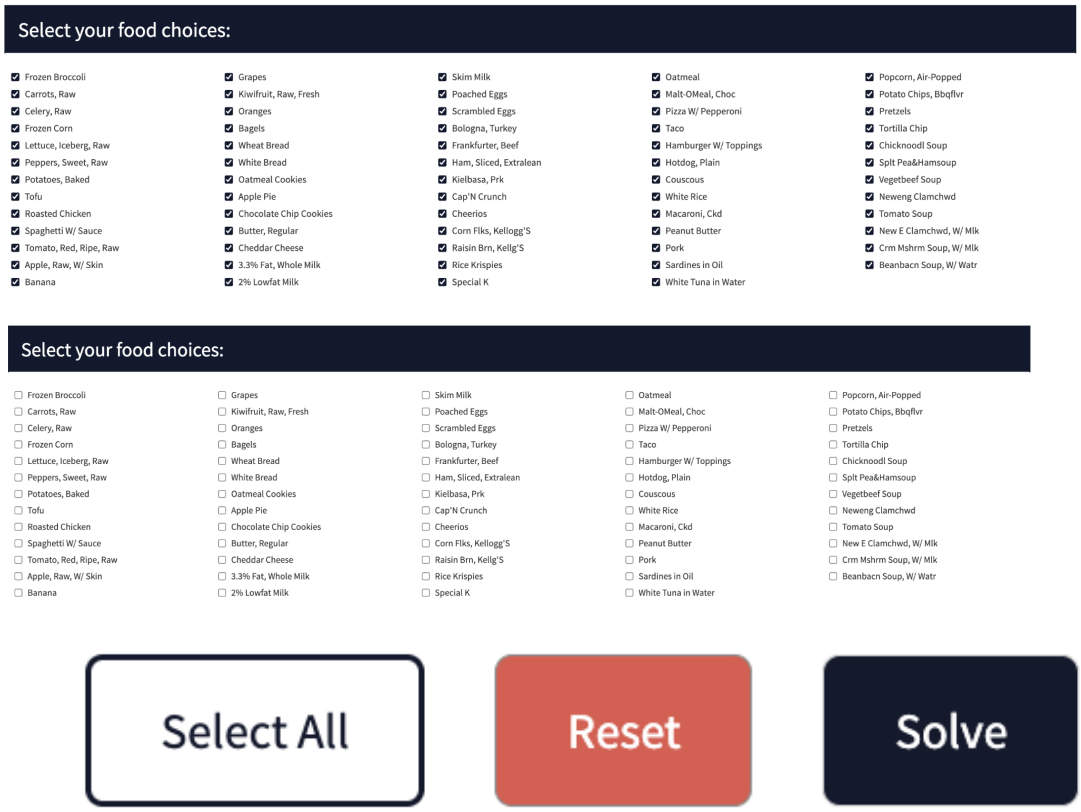
2.) After clicking, you will be redirected to this page



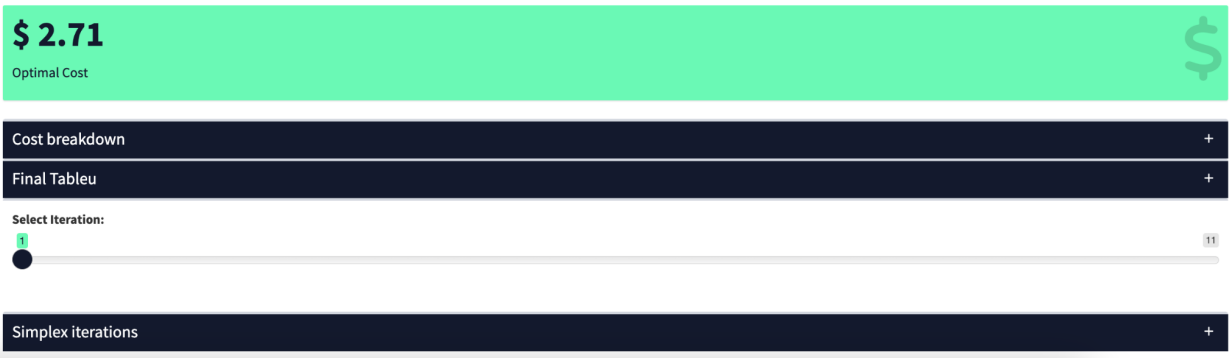
3.) Click the checkboxes of your diet.



4.) You could also select all of the foods by clicking the the “Select all” button and reset the clicking the “Reset” button.

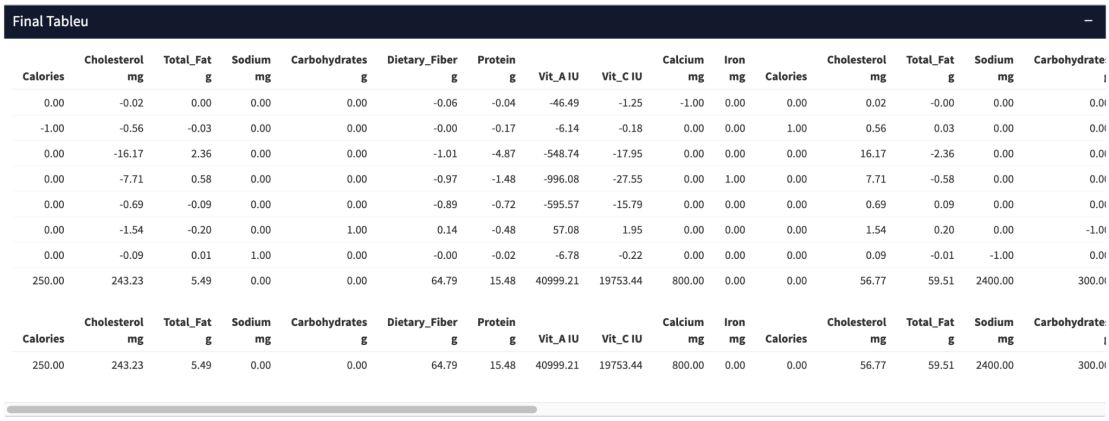


5.) You should see this upon choosing foods that have a feasible solution



6.) You could see the cost breakdown by clicking on the box

7.) You can also view the final tableau



8.) You can also view the iterations of the simplex method using the slider

9.) Selecting a selection of foods with an infeasible solution will show this page.