R Notebook

```
rm(list = ls())
library(lpSolve)
```

```
## Warning: package 'lpSolve' was built under R version 3.5.2
```

```
library(plotly)
```

```
## Loading required package: ggplot2
```

```
##
## Attaching package: 'plotly'
```

```
## The following object is masked from 'package:ggplot2':
##
##     last_plot
```

```
## The following object is masked from 'package:stats':
##
##     filter
```

```
## The following object is masked from 'package:graphics':
##
##     layout
```

```
library('knitr')
```

```
## Warning: package 'knitr' was built under R version 3.5.2
```

```
library('kableExtra')
```

```
## Warning: package 'kableExtra' was built under R version 3.5.2
```

```
library('readxl')
```

```
## Warning: package 'readxl' was built under R version 3.5.2
```

```
knitr::opts_chunk$set(echo = FALSE)
source<-read_excel('Organized.xlsx')
```

```
## New names:
## * `` -> ...1
## * `` -> ...2
## * `` -> ...3
## * `` -> ...4
## * `` -> ...5
## * ... and 22 more problems
```

	mean	std	p	c1	c2	c3
beer	119.02	87.48	2.96	1.78	0.49	0.51
wine	32.45	25.68	11.98	7.13	2.49	1.33
tea	27.55	16.82	5.95	3.65	0.20	0.36
bread	87.08	49.78	0.93	0.63	0.21	0.05
egg	57.63	22.75	4.29	3.24	1.03	0.21
fish	44.22	14.07	2.79	1.75	1.20	0.49
fruit	124.07	42.85	4.69	3.35	0.81	0.42
juice	45.28	13.69	3.99	2.56	0.33	0.45
vegetable	1197.47	355.09	2.86	1.96	0.78	0.56
tobacco	32.82	24.25	12.99	9.93	0.31	0.81
meat	126.84	10.17	20.99	16.67	3.89	2.10
milk	60.20	11.22	1.94	1.28	0.60	0.35
coffee	19.47	9.76	4.93	3.17	0.44	0.50
dairy	15.75	9.69	2.28	1.63	0.55	0.13
oil	25.02	8.65	2.42	1.74	0.72	0.08

	demand														
	beer	wine	tea	bread	egg	fish	fruit	juice	vegetable	tobacco	meat	milk	coffee	dairy	oil
income	-0.65	1.06	0.61	-0.21	0.33	0.69	0.31	1.09	1.14	1.49	0.6	1.44	-0.39	0.66	1.02

	price														
	beer	wine	tea	bread	egg	fish	fruit	juice	vegetable	tobacco	meat	milk	coffee	dairy	oil
beer	-1.98	0.74	0.33	0.00	0.00	0.00	0.00	0.00	0.00	-0.02	0.19	0.00	0.00	0.00	0.00
wine	-0.21	-0.84	0.12	0.00	0.00	0.00	0.00	0.00	0.00	-0.02	0.19	0.00	0.00	0.00	0.00
tea	0.10	-0.08	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00
bread	0.00	0.00	0.00	0.06	-0.03	-0.05	-0.01	0.00	-0.05	0.00	0.00	0.00	0.00	-0.01	0.00
egg	0.00	0.00	0.00	-0.23	-0.22	-0.04	-0.06	0.07	-0.03	0.00	0.04	-0.09	0.01	-0.08	0.01
fish	0.00	0.00	0.00	-0.15	-0.05	-0.53	0.00	-0.06	0.01	0.00	0.02	-0.16	-0.02	-0.04	-0.01
fruit	0.00	0.00	0.00	-0.09	-0.04	0.00	-0.60	-0.04	-0.03	0.00	0.00	0.30	0.04	-0.08	0.04
juice	0.00	0.00	-0.03	-0.06	0.00	-0.09	-0.06	-0.85	0.00	0.00	0.00	0.14	-0.02	-0.05	0.00
vegetable	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	-0.54	-0.04	0.01	0.20	0.01	-0.03	0.02
tobacco	-0.07	-0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.07	0.05	0.00	0.00	0.00	0.00
meat	0.01	0.01	0.00	0.00	0.02	0.08	-0.04	0.00	-0.02	0.04	-0.48	0.17	0.00	-0.23	0.05
milk	0.00	0.00	0.01	0.00	-0.12	-0.01	0.07	0.08	0.08	0.00	0.02	-0.96	0.01	0.00	-0.01
coffee	0.00	0.00	0.00	0.00	0.01	0.00	0.03	0.00	-0.04	0.00	0.00	0.03	0.60	0.00	0.00
dairy	0.00	0.00	0.00	-0.04	-0.01	-0.01	-0.01	0.00	-0.01	0.00	-0.07	0.00	0.00	-0.55	0.00
oil	0.00	0.00	0.00	0.00	0.00	-0.02	0.01	0.00	0.03	0.00	0.09	0.04	0.00	0.00	-0.70

X1	X2	X3	X4
x_{1}^*	x_{2}^*	x_{3}^*	x_{4}^*
79.94	21.35	20.79	55.88
x_{5}^*	x_{6}^*	x_{7}^*	x_{8}^*
42.05	37.94	99.2	38.33
x_{9}^*	x_{10}^*	x_{11}^*	x_{12}^*
1064.32	18.11	119.07	55.49
x_{13}^*	x_{14}^*	x_{15}^*	P^*
15.42	9.25	18.18	1449.32

	beer	wine	tea	bread	egg	fish	fruit	juice	vegetable	tobacco	meat	milk	coffee	dairy	oil
per percentage of sigma decrease	1.13	1.13	0.35	0.16	0.28	0.21	0.78	0.25	4.60	0.79	0.89	0.11	0.20	0.07	0.08
per percentage of p increase	-1.03	1.89	1.74	0.10	1.57	1.08	4.20	0.85	22.66	1.95	22.82	4.24	1.04	-1.68	0.86

beer	wine	tea	bread	egg	fish	fruit	juice	vegetable	tobacco	meat	milk	coffee	dairy	oil	direction	RHS
1	1	0	0	0	0	0	0	0.0	0	0	0	0	0	0	<=	120
0	0	0	0	0	0	1	0	1.0	0	0	0	0	0	0	<=	1200
0	0	0	1	0	1	1	0	0.1	0	1	1	0	1	0	<=	550
0	0	1	0	0	0	0	0	0.0	0	0	0	1	0	0	>=	30
0	0	0	0	0	0	0	0	0.0	0	0	0	0	0	1	<=	30
1	1	0	0	0	0	0	1	0.0	0	0	1	0	0	1	<=	300
0	0	0	0	1	0	0	0	0.0	0	0	0	0	0	0	<=	60

	beer	wine	tea	bread	egg	fish	fruit	juice	vegetable	tobacco	meat	milk	coffee	dairy	oil
maximum percentage of p decrease	1	2	5	4	5	3	3	2	4	2	7	2	3	9	4
maximum percentage of p increase	1	2	8	3	9	2	4	2	5	2	3	4	4	3	5
maximum percentage of std decrease	7	14	100	100	100	100	7	100	6	100	100	100	100	100	100