R Notebook

```
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)
output<-read_excel('Example solver.xlsx')
```

```
## New names:
## * `` -> ...2
## * `` -> ...3
## * `` -> ...4
## * `` -> ...5
## * `` -> ...6
## * ... and 2 more problems
```

```
answer<-read_excel('Example solver.xlsx', sheet = 2)
```

```
## New names:
## * `` -> ...2
## * `` -> ...3
## * `` -> ...4
## * `` -> ...5
## * `` -> ...6
## * ... and 1 more problem
```

Products	**Demand Realisations**											
	1	2	3	4	5	6	7	8	9	10	11	12
product a	200	220	180	190	190	210	240	250	200	190	210	240
product b	250	230	200	180	210	210	170	150	180	220	260	260

	product a	product b
mean	210	210
standard deviation	22.96	35.93
median	205	210
1st quantile	190	180
3rd quantile	225	235

variable	final value	reduced cost	coefficient	allowable increase	allowable decrease
y_1^1	7.1	0.0	-0.8	0.3	5e-01
y_1^2	0.0	-0.8	-0.8	0.8	1e+04
y_1^3	27.1	0.0	-0.8	0.3	5e-01
y_1^4	17.1	0.0	-0.8	0.3	5e-01
y_1^5	17.1	0.0	-0.8	0.3	5e-01
y_1^6	0.0	-0.8	-0.8	0.8	1e+04
y_1^7	0.0	-0.8	-0.8	0.8	1e+04
y_1^8	0.0	-0.8	-0.8	0.8	1e+04
y_1^9	7.1	0.0	-0.8	0.3	5e-01
y_1^10	17.1	0.0	-0.8	0.3	5e-01
y_1^11	0.0	-0.8	-0.8	0.8	1e+04
y_1^12	0.0	-0.8	-0.8	0.8	1e+04
y_2^1	0.0	-0.8	-0.8	0.8	1e+04
y_2^2	0.0	-0.8	-0.8	0.8	1e+04
y_2^3	10.0	0.0	-0.8	0.6	2e-01
y_2^4	30.0	0.0	-0.8	0.6	2e-01
y_2^5	0.0	-0.6	-0.8	0.6	1e+04
y_2^6	0.0	-0.8	-0.8	0.8	1e+04
y_2^7	40.0	0.0	-0.8	0.6	2e-01
y_2^8	60.0	0.0	-0.8	0.6	2e-01
y_2^9	30.0	0.0	-0.8	0.6	2e-01
y_2^10	0.0	-0.8	-0.8	0.8	1e+04
y_2^11	0.0	-0.8	-0.8	0.8	1e+04
y_2^12	0.0	-0.8	-0.8	0.8	1e+04
z_1^1	0.0	-0.1	-0.1	0.1	1e+04
z_1^2	12.9	0.0	-0.1	0.1	3e-01
z_1^3	0.0	-0.1	-0.1	0.1	1e+04
z_1^4	0.0	-0.1	-0.1	0.1	1e+04
z_1^5	0.0	-0.1	-0.1	0.1	1e+04
z_1^6	2.9	0.0	-0.1	0.1	3e-01
z_1^7	32.9	0.0	-0.1	0.1	3e-01
z_1^8	42.9	0.0	-0.1	0.1	3e-01
z_1^9	0.0	-0.1	-0.1	0.1	1e+04
z_1^10	0.0	-0.1	-0.1	0.1	1e+04
z_1^11	2.9	0.0	-0.1	0.1	3e-01
z_1^12	32.9	0.0	-0.1	0.1	3e-01
z_2^1	40.0	0.0	-0.2	0.2	6e-01
z_2^2	20.0	0.0	-0.2	0.2	6e-01
z_2^3	0.0	-0.2	-0.2	0.2	1e+04
z_2^4	0.0	-0.2	-0.2	0.2	1e+04
z_2^5	0.0	0.0	-0.2	0.2	6e-01
z_2^6	0.0	0.0	-0.2	0.2	6e-01
z_2^7	0.0	-0.2	-0.2	0.2	1e+04
z_2^8	0.0	-0.2	-0.2	0.2	1e+04
z_2^9	0.0	-0.2	-0.2	0.2	1e+04
z_2^10	10.0	0.0	-0.2	0.2	6e-01
z_2^11	50.0	0.0	-0.2	0.2	6e-01
z_2^12	50.0	0.0	-0.2	0.2	6e-01
x_1	207.1	0.0	5.0	0.3	5e-01
x_2	210.0	0.0	3.0	0.6	2e-01

row	final value	shadow price	constraint RHS	allowable increase	allowable decrease
over_1^5 used	190.0	0.8	190	17.1	10000.0
over_1^6 used	207.1	0.0	210	10000.0	2.9
over_1^7 used	207.1	0.0	240	10000.0	32.9
over_1^8 used	207.1	0.0	250	10000.0	42.9
over_1^9 used	200.0	0.8	200	7.1	10000.0
over_1^10 used	190.0	0.8	190	17.1	10000.0
over_1^11 used	207.1	0.0	210	10000.0	2.9
over_1^12 used	207.1	0.0	240	10000.0	32.9
under_1^1 used	207.1	0.0	200	7.1	10000.0

(continued)

row	final value	shadow price	constraint RHS	allowable increase	allowable decrease
under_1^2 used	220.0	-0.1	220	10000.0	12.9
under_1^3 used	207.1	0.0	180	27.1	10000.0
under_1^4 used	207.1	0.0	190	17.1	10000.0
under_1^5 used	207.1	0.0	190	17.1	10000.0
under_1^6 used	210.0	-0.1	210	10000.0	2.9
under_1^7 used	240.0	-0.1	240	10000.0	32.9
under_1^8 used	250.0	-0.1	250	10000.0	42.9
under_1^9 used	207.1	0.0	200	7.1	10000.0
under_1^10 used	207.1	0.0	190	17.1	10000.0
under_1^11 used	210.0	-0.1	210	10000.0	2.9
under_1^12 used	240.0	-0.1	240	10000.0	32.9
time_A used	2088.6	0.0	2200	10000.0	111.4
over_2^1 used	210.0	0.0	250	10000.0	40.0
over_2^2 used	210.0	0.0	230	10000.0	20.0
over_2^3 used	200.0	0.8	200	10.0	10000.0
over_2^4 used	180.0	0.8	180	30.0	10000.0
over_2^5 used	210.0	0.2	210	0.0	4.0
over_2^6 used	210.0	0.0	210	10000.0	0.0
over_2^7 used	170.0	0.8	170	40.0	10000.0
over_2^8 used	150.0	0.8	150	60.0	10000.0
over_2^9 used	180.0	0.8	180	30.0	10000.0
over_2^10 used	210.0	0.0	220	10000.0	10.0
time_B used	2500.0	0.1	2500	20.0	50.0
over_2^11 used	210.0	0.0	260	10000.0	50.0
over_2^12 used	210.0	0.0	260	10000.0	50.0
under_2^1 used	250.0	-0.2	250	10000.0	40.0
under_2^2 used	230.0	-0.2	230	10000.0	20.0
under_2^3 used	210.0	0.0	200	10.0	10000.0
under_2^4 used	210.0	0.0	180	30.0	10000.0
under_2^5 used	210.0	-0.2	210	10000.0	0.0
under_2^6 used	210.0	-0.2	210	10000.0	0.0
under_2^7 used	210.0	0.0	170	40.0	10000.0
under_2^8 used	210.0	0.0	150	60.0	10000.0
time_C used	3337.1	0.0	3500	10000.0	162.9
under_2^9 used	210.0	0.0	180	30.0	10000.0
under_2^10 used	220.0	-0.2	220	10000.0	10.0
under_2^11 used	260.0	-0.2	260	10000.0	50.0
under_2^12 used	260.0	-0.2	260	10000.0	50.0
over_1^1 used	200.0	0.8	200	7.1	10000.0
over_1^2 used	207.1	0.0	220	10000.0	12.9
over_1^3 used	180.0	0.8	180	27.1	10000.0
over_1^4 used	190.0	0.8	190	17.1	10000.0