SUNBLOCK DATA ANALYSIS PROJECT

Haneen Salah

DATA

- We renamed some variables to be easy manipulate by R

- For instance, 0 represents no, 1 represents yes

- 1 female , 0 male

- Countries from 0-7

#	SPF	UVA	Fragrance	Country of Origin	Price	Oz
1	15	2.5	1	6	6.94	4.00
2	30	3.7	0	7	10.99	3.00
3	20	3.7	0	7	19.99	1.70
4	50	4.1	0	7	6.99	4.00
5	50	4.5	0	7	11.99	4.00
6	30	5.2	0	7	16.64	5.00
7	30	5.2	0	7	32.00	8.00
8	50	5.3	1	3	14.99	2.00
9	50	5.3	0	7	19.00	3.40
10	30	5.4	1	3	42.00	3.00
11	27	5.6	0	7	38.46	2.50
12	46	5.8	0	7	30.00	1.70
13	38	6.1	0	4	34.00	3.30
14	50	6.5	1	4	17.50	1.94
15	58	7.0	0	7	18.74	2.50
16	50	7.1	0	7	21.00	1.70
17	30	7.1	1	7	26.00	4.20
18	25	7.2	0	6	22.00	1.40
19	70	7.6	1	7	200.00	1.40
20	30	7.7	0	6	100.00	8.75
21	50	8.0	1	7	19.00	3.00
22	70	8.0	0	7	20.00	1.70
23	50	8.0	0	4	9.60	1.30
24	30	8.1	0	7	24.00	1.70
25	60	8.5	1	7	40.00	3.30
26	60	8.6	1	7	0.66	1.69
27	30	8.7	1	7	45.00	3.30
28	50	8.8	1	4	34.00	1.69
29	50	8.8	1	6	20.00	1.20
30	50	9.2	0	4	14.50	1.20
31	30	9.3	0	7	11.99	3.00
32	50	10.0	0	4	13.50	1.00
33	55	10.2	0	4	35.00	2.10
34	100	10.3	1	7	11.99	3.00
35	30	10.5	1	1	21.99	3.00
36	110	10.6	1	7	8.97	6.00
37	45	10.6	0	1	27.59	5.00
38	50	10.8	0	7	8.48	6.00
39	70	10.8	1	7	200.00	5.00
40	50	20.0	0	4	54.50	6.70
41	50	20.0	1	2	24.00	1.70
42	30	25.0	0	3	37.00	1.70
43	50	31.0	0	3	35.00	1.70
44	50	38.0	1	2	29.28	1.30
45	50	38.0	1	2	48.00	3.30
46	50	39.0	0	1	40.00	1.70
47	40	1530.0	0	7	20.00	3.50
48	30	4.2	1	7	7.00	6.00
49	60	13.0	1	1	16.50	4.00
50	50	7.0	1	6	21.00	1.70
51	30	8.3	1	1	33.00	6.00
52	50	10.0	1	4	255.00	4.00
53	30	8.3	1	1	350.00	3.50
54	50	7.9	1	4	400.00	4.00
55	50	10.0	1	1	200.00	4.20
56	40	6.6	1	4	12.64	4.00
57	30	30.0	1	3	25.00	4.20
58	30	4.6	1	2	33.00	13.50
59	50	6.6	1	2	42.00	13.50
60	50	40.0	1	2	22.00	1.70
61	0	16.0	0	2	26.00	1.70
62	50	25.0	0	1	88.00	4.00
63	47	6.7	0	1	29.29	4.00
64	50	4.9	0	6	38.99	7.00
65	30	17.7	0	0	10.00	1.00
66	30	40.0	0	5	24.00	8.80
67	50	25.0	0	1	13.60	6.70
68	30	6.7	1	0	12.80	3.50
69	50	16.0	1	4	19.00	1.35
70	50	16.0	0	0	12.00	1.00
71	50	43417.0	0	0	70.00	1.70
72	15	9.6	0	1	88.00	4.00
73	30	7.9	0	7	77.00	3.50
74	30	9.1	0	6	230.00	4.20
75	60	40.0	0	3	100.00	3.50
76	45	10.0	1	3	250.00	1.70
77	45	8.3	1	3	66.00	6.00
78	30	7.9	1	6	12.00	4.00
79	30	8.3	1	0	20.00	1.00
80	30	25.0	0	5	25.00	4.20
81	15	40.0	1	5	40.00	6.70
82	30	2.5	0	5	55.00	8.80
83	60	9.1	0	3	33.00	8.80
84	60	25.0	0	6	50.00	1.00
85	50	6.6	0	2	42.50	6.70
86	50	17.7	0	2	24.00	1.30
87	50	25.0	1	2	30.00	5.92
88	50	7.9	1	2	80.00	5.92
89	30	6.6	1	7	10.99	3.00
90	30	4.5	1	3	210.00	3.00
91	50	9.1	1	3	200.00	1.70
92	50	9.0	1	6	89.00	4.00
93	50	25.0	0	6	7.54	8.00
94	70	9.6	0	5	120.00	8.00
95	55	16.0	0	2	7.55	4.00
96	30	22.0	0	5	80.00	1.70

Fragpep	gender	SPFpep	Pricepep
0	1	100	300.00
0	1	100	300.00
0	1	100	300.00
0	1	100	300.00
0	1	100	300.00
0	1	100	300.00
0	1	100	300.00
0	1	100	300.00
0	1	100	300.00
0	1	100	300.00
0	1	100	300.00
0	1	100	300.00
0	1	100	300.00
0	1	100	300.00
0	1	100	300.00
0	1	100	300.00
0	1	100	300.00
0	1	100	300.00
0	1	100	300.00
0	1	100	300.00
0	1	100	300.00
0	1	100	300.00
0	1	100	300.00
0	1	100	300.00
1	1	100	300.00
1	1	100	300.00
1	1	100	300.00
1	1	100	300.00
1	1	100	300.00

Fragpep	gender	SPFpep	Pricepep
0	0	100	100.00
0	0	100	100.00
0	0	100	100.00
0	0	100	100.00
0	0	100	100.00
0	1	100	100.00
0	1	100	100.00
0	1	100	100.00
0	1	100	200.00
0	1	100	200.00
0	1	100	200.00
0	1	100	200.00
0	1	100	200.00
0	1	100	200.00
0	1	100	200.00
0	1	100	200.00
0	1	100	200.00
0	1	100	200.00
0	1	100	200.00
0	1	100	200.00
0	1	100	200.00
0	1	100	200.00
0	1	100	200.00
0	1	100	200.00
0	1	100	300.00
0	1	100	300.00
0	1	100	300.00

gender	SPFpep	Pricepep
0	15	6.94
0	15	6.94
0	15	6.94
0	15	6.94
0	15	6.94
0	15	6.94
0	15	6.94
0	15	6.94
0	15	6.94
0	15	6.94
0	20	30.00
0	20	30.00
0	20	30.00
0	20	30.00
0	20	30.00
0	20	30.00
0	20	30.00
0	20	30.00
0	20	30.00
0	20	30.00
0	20	30.00
0	20	30.00
0	20	30.00
0	20	30.00
0	20	30.00
0	20	30.00
0	20	30.00

97	50	40.0	0	5	60.00	4.00
98	50	25.0	0	6	77.00	3.50
99	30	6.6	1	2	20.00	6.70
100	35	2.5	1	7	32.00	1.00
101	60	10.0	1	6	80.00	4.20
102	30	30.0	0	7	39.00	3.00

Instagram Story Poll (left panel)

Haneen Salah · 2h

Do you prefer sunscreens with fragrancy?

YES	NO
14%	86%

31 Viewers

Voters (middle panel)

Voters

YES	NO

amira.elsayed.35
Amira El Sayed · voted yes

nourelfawal
Nour Elfawal · voted yes

amr_salaheldin
amr salah · voted yes

nada_abdelfatta7
Nada Yasser · voted yes

hyamattar
Hya Mattar · voted yes

ayaelsayedmostafa
Aya Mostafa · voted yes

_xlamis
Marceline. · voted yes

mayaahmed252
Mayar Ahmed ❄ · voted yes

imanmuhmed
iman · voted yes

norhanashraf708
NouRhan Ashraf 🌹 · voted yes

sohaila_sami

Share Results (right panel)
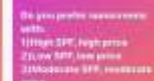
Share Results

Ragaa Ahmed
Yes

Nabila Wael Elabbasy
No

Amr Ayman
No

Sherihan Art
No

Donya Essam
No

Marwa Abdelmoez
No

Frequency

```
> library(MASS)
> school=Book1$SPF
> school.freq=table(school)
> school.freq
school
   0   15   20   25   27   30   35   38   40   45   46   47   50   55   58   60   70  100  110
   1    3    1    1    1   30    1    1    2    3    1    1   40    2    1    7    4    1    1
> |
```

```
> school=Book1$UVA
> school.freq=table(school)
> school.freq
school
  2.5   3.7   4.1   4.2   4.5   4.6   4.9   5.2   5.3   5.4   5.6   5.8   6.1   6.5   6.6
    3     2     1     1     2     1     1     2     2     1     1     1     1     1     5
  6.7     7   7.1   7.2   7.6   7.7   7.9     8   8.1   8.3   8.5   8.6   8.7   8.8     9
    2     2     2     1     1     1     4     3     1     4     1     1     1     2     1
  9.1   9.2   9.3   9.6    10  10.2  10.3  10.5  10.6  10.8    13    16  17.7    20    22
    3     1     1     2     5     1     1     1     2     2     1     4     2     2     1
   25    30    31    38    39    40  1530 43417
    8     2     1     2     1     5     1     1
```

```
school
 0  1
54 48
>
```

```
> school=Book1$Price
> school.freq=table(school)
> school.freq
school
 0.66  6.94  6.99     7  7.54  7.55  8.48  8.97   9.6    10 10.99 11.99    12 12.64 12.8
    1     1     1     1     1     1     1     1     1     1     2     3     2     1    1
 13.5  13.6  14.5 14.99  16.5 16.64  17.5 18.74          19 19.99    20    21 21.99   22   24
    1     1     1     1     1     1     1     1           3     1     5     2     1    2    4
   25    26 27.59 29.28 29.29    30    32    33    34    35    37 38.48 38.99    39   40
    2     2     1     1     1     2     2     3     2     2     1     1     1     1    3
   42  42.5    45    48    50  54.5    55    60    66    70    77    80    88    89  100
    2     1     1     1     1     1     1     1     1     1     2     3     2     1    2
  120   200   210   230   250   255   350   400
    1     4     1     1     1     1     1     1
```

```
> school=Book1$`Country of Origin`
> school.freq=table(school)
> school.freq
school
 0  1  2  3  4  5  6  7
 5 11 13 11 12  7 13 30
>
```

```
> school=Book1$Oz
> school.freq=table(school)
> school.freq
school
    1  1.2  1.3 1.35  1.4 1.69  1.7 1.94    2  2.1  2.5    3  3.3  3.4  3.5    4  4.2    5
    6    2    3    1    2    2   16    1    1    1    2    9    4    1    6   14    6    3
 5.92    6  6.7    7    8 8.75  8.8 13.5
    2    5    5    1    3    1    3    2
```

Relative frequency

```
> school=Book1$Oz
> school.freq=table(school)
> school.relfreq=school.freq/nrow(Book1)
> school.relfreq
school
          1          1.2          1.3         1.35          1.4         1.69          1.7         1.94            2          2.1
0.058823529 0.019607843 0.029411765 0.009803922 0.019607843 0.019607843 0.156862745 0.009803922 0.009803922 0.009803922
        2.5            3          3.3          3.4          3.5            4          4.2            5         5.92            6
0.019607843 0.088235294 0.039215686 0.009803922 0.058823529 0.137254902 0.058823529 0.029411765 0.019607843 0.049019608
        6.7            7            8         8.75          8.8         13.5
0.049019608 0.009803922 0.029411765 0.009803922 0.029411765 0.019607843
>
```

```
> school=Book1$UVA
> school.freq=table(school)
> school.relfreq=school.freq/nrow(Book1)
> school.relfreq
school
        2.5          3.7          4.1          4.2          4.5          4.6          4.9          5.2          5.3          5.4
0.029411765 0.019607843 0.009803922 0.009803922 0.019607843 0.009803922 0.009803922 0.019607843 0.019607843 0.009803922
        5.6          5.8          6.1          6.5          6.6          6.7            7          7.1          7.2          7.6
0.009803922 0.009803922 0.009803922 0.009803922 0.049019608 0.019607843 0.019607843 0.019607843 0.009803922 0.009803922
        7.7          7.9            8          8.1          8.3          8.5          8.6          8.7          8.8            9
0.009803922 0.039215686 0.029411765 0.009803922 0.039215686 0.009803922 0.009803922 0.009803922 0.019607843 0.009803922
        9.1          9.2          9.3          9.6           10         10.2         10.3         10.5         10.6         10.8
0.029411765 0.009803922 0.009803922 0.019607843 0.049019608 0.009803922 0.009803922 0.009803922 0.019607843 0.019607843
         13           16         17.7           20           22           25           30           31           38           39
0.009803922 0.039215686 0.019607843 0.019607843 0.009803922 0.078431373 0.019607843 0.009803922 0.019607843 0.009803922
         40         1530        43417
0.049019608 0.009803922 0.009803922
>
```

```
          0            0            0            0            0            0            0            0
> library(MASS)
> school=Book1$SPF
> school.freq=table(school)
> school.relfreq=school.freq/nrow(Book1)
> school.relfreq
school
          0           15           20           25           27           30           35           38           40           45
0.009803922 0.029411765 0.009803922 0.009803922 0.009803922 0.294117647 0.009803922 0.009803922 0.019607843 0.029411765
         46           47           50           55           58           60           70          100          110
0.009803922 0.009803922 0.392156863 0.019607843 0.009803922 0.068627451 0.039215686 0.009803922 0.009803922
>
```

```
> school=Book1$Fragrance
> school.freq=table(school)
> school.relfreq=school.freq/nrow(Book1)
> school.relfreq
school
        0         1
0.5294118 0.4705882
>
```

```
> school=Book1$`Country of Origin`
> school.freq=table(school)
> school.relfreq=school.freq/nrow(Book1)
> school.relfreq
school
         0          1          2          3          4          5          6          7
0.04901961 0.10784314 0.12745098 0.10784314 0.11764706 0.06862745 0.12745098 0.29411765
>
```

```
> school=Book1$Price
> school.freq=table(school)
> school.relfreq=school.freq/nrow(Book1)
> school.relfreq
school
      0.66        6.94        6.99           7        7.54        7.55        8.48        8.97         9.6          10
0.009803922 0.009803922 0.009803922 0.009803922 0.009803922 0.009803922 0.009803922 0.009803922 0.009803922 0.009803922
     10.99       11.99          12       12.64        12.8        13.5        13.6        14.5       14.99        16.5
0.019607843 0.029411765 0.019607843 0.009803922 0.009803922 0.009803922 0.009803922 0.009803922 0.009803922 0.009803922
     16.64        17.5       18.74          19       19.99          20          21       21.99          22          24
0.009803922 0.009803922 0.009803922 0.029411765 0.009803922 0.049019608 0.019607843 0.009803922 0.019607843 0.039215686
        25          26       27.59       29.28       29.29          30          32          33          34          35
0.019607843 0.019607843 0.009803922 0.009803922 0.009803922 0.019607843 0.019607843 0.029411765 0.019607843 0.019607843
        37       38.48       38.99          39          40          42        42.5          45          48          50
0.009803922 0.009803922 0.009803922 0.009803922 0.029411765 0.019607843 0.009803922 0.009803922 0.009803922 0.009803922
      54.5          55          60          66          70          77          80          88          89         100
0.009803922 0.009803922 0.009803922 0.009803922 0.009803922 0.019607843 0.029411765 0.019607843 0.009803922 0.019607843
       120         200         210         230         250         255         350         400
0.009803922 0.039215686 0.009803922 0.009803922 0.009803922 0.009803922 0.009803922 0.009803922
>
```

Pie chart
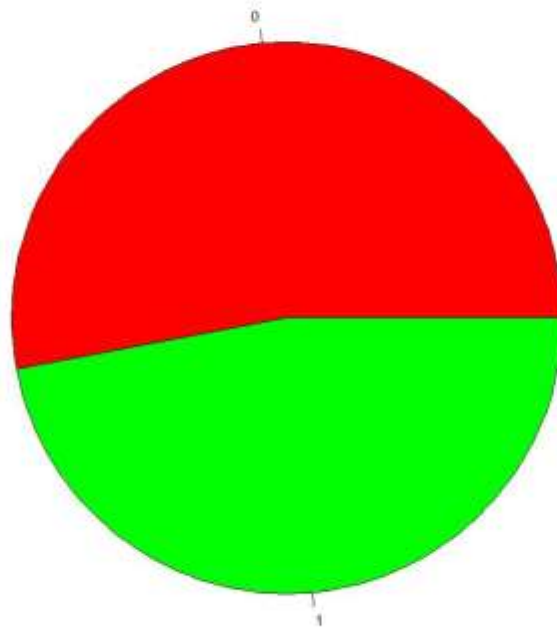

```
> school=Book1$Fragrance
> school.freq=table(school)
> pie(school.freq,col=colors)
```
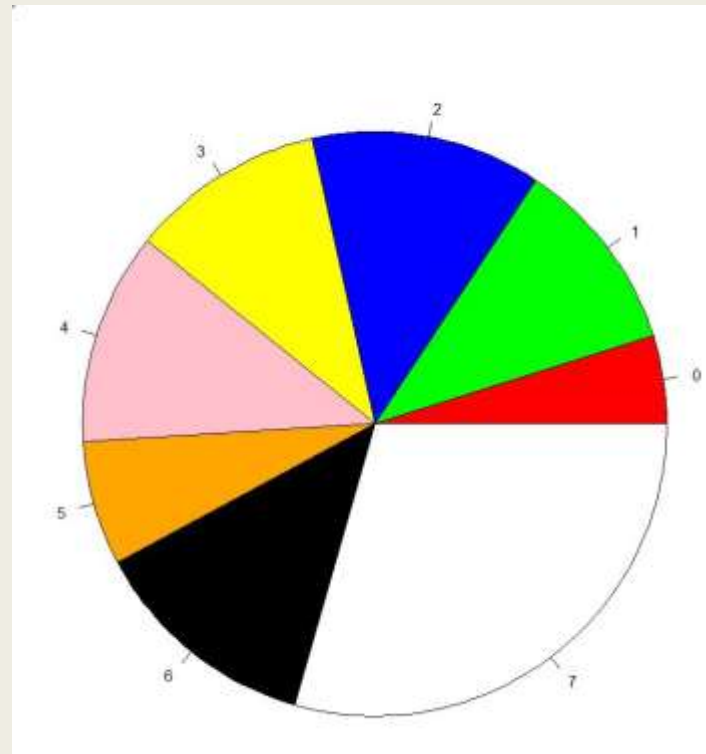
```
school=Book1$Fragrance
school.freq=table(school)
pie(school.freq,col=colors)
school=Book1$`Country of Origin`
school.freq=table(school)
pie(school.freq,col=colors)
```

Bar chart
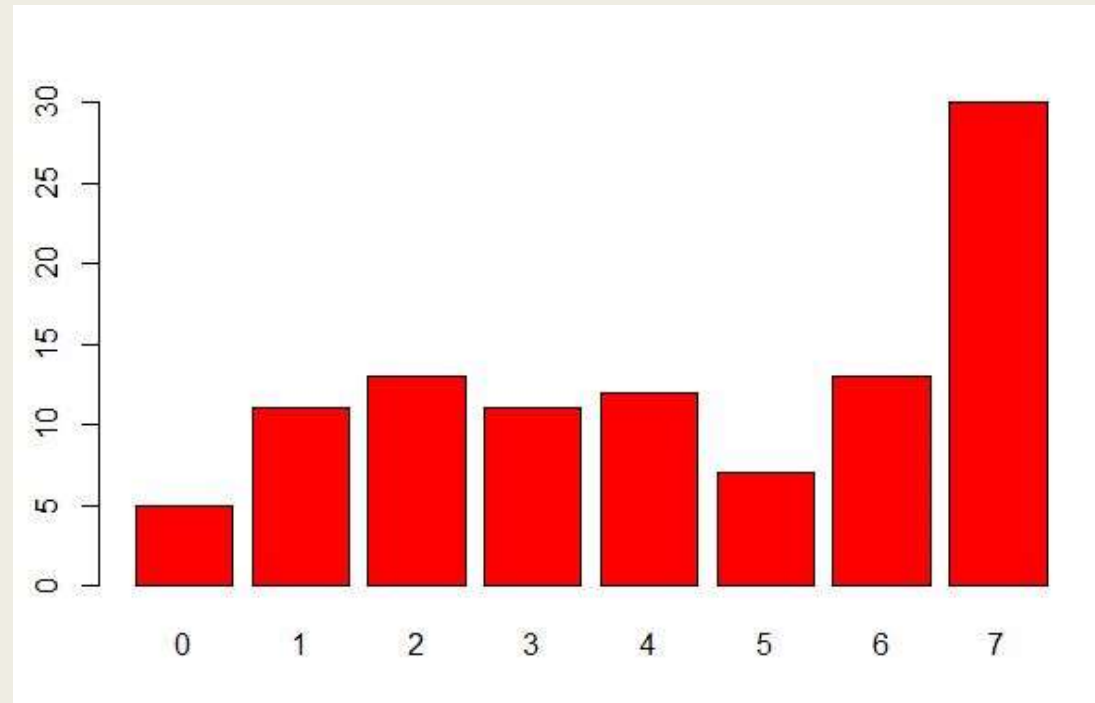

```
> barplot(school.freq, col = colors)
> school=Book1$Fragrance
> school.freq=table(school)
> barplot(school.freq, col = colors)
> school=Book1$`Country of Origin`
> school.freq=table(school)
> barplot(school.freq, col = colors)
>
```
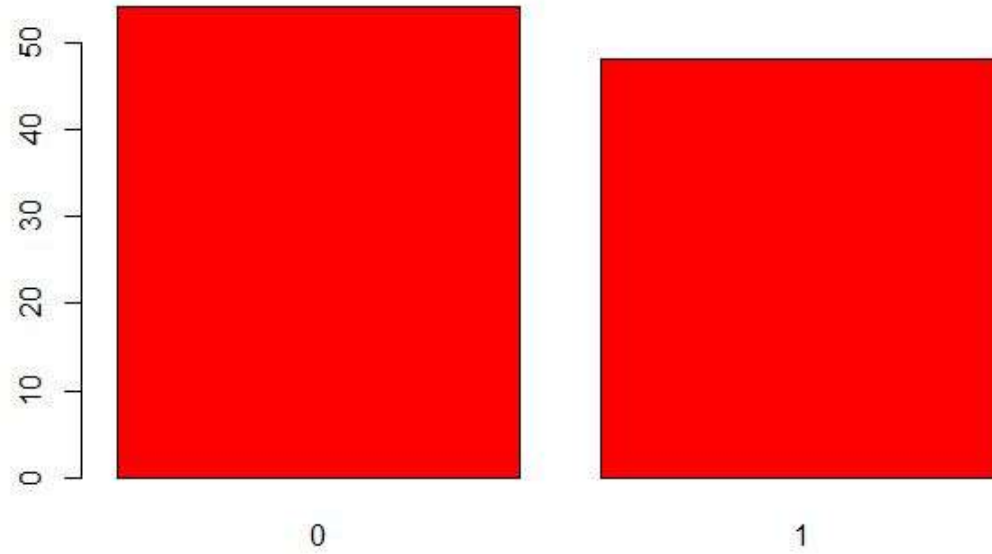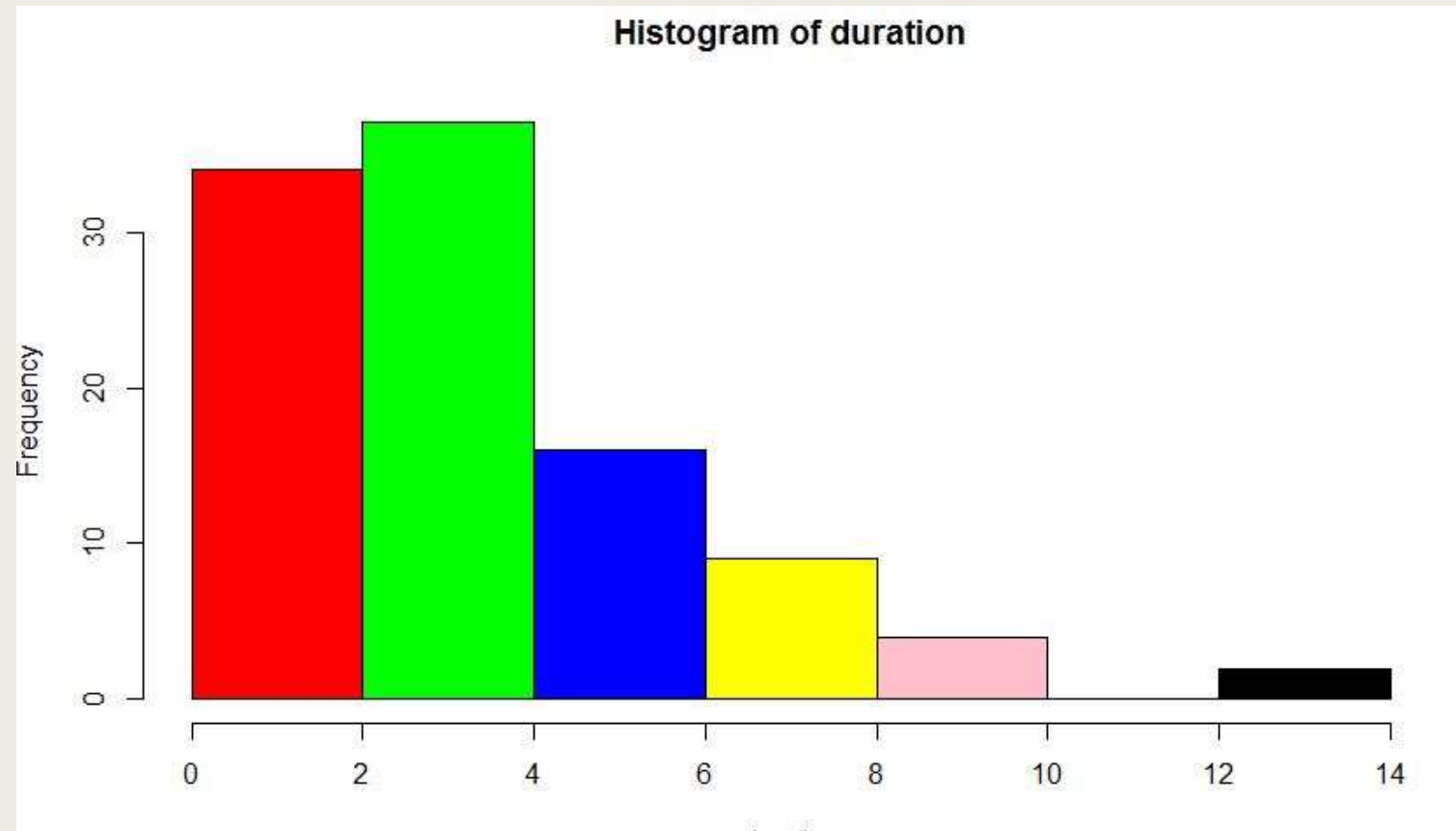
```
barplot(school.freq, col = colors)
school=Book1$Fragrance
school.freq=table(school)
barplot(school.freq, col = colors)
```

Histogram

Histogram of duration
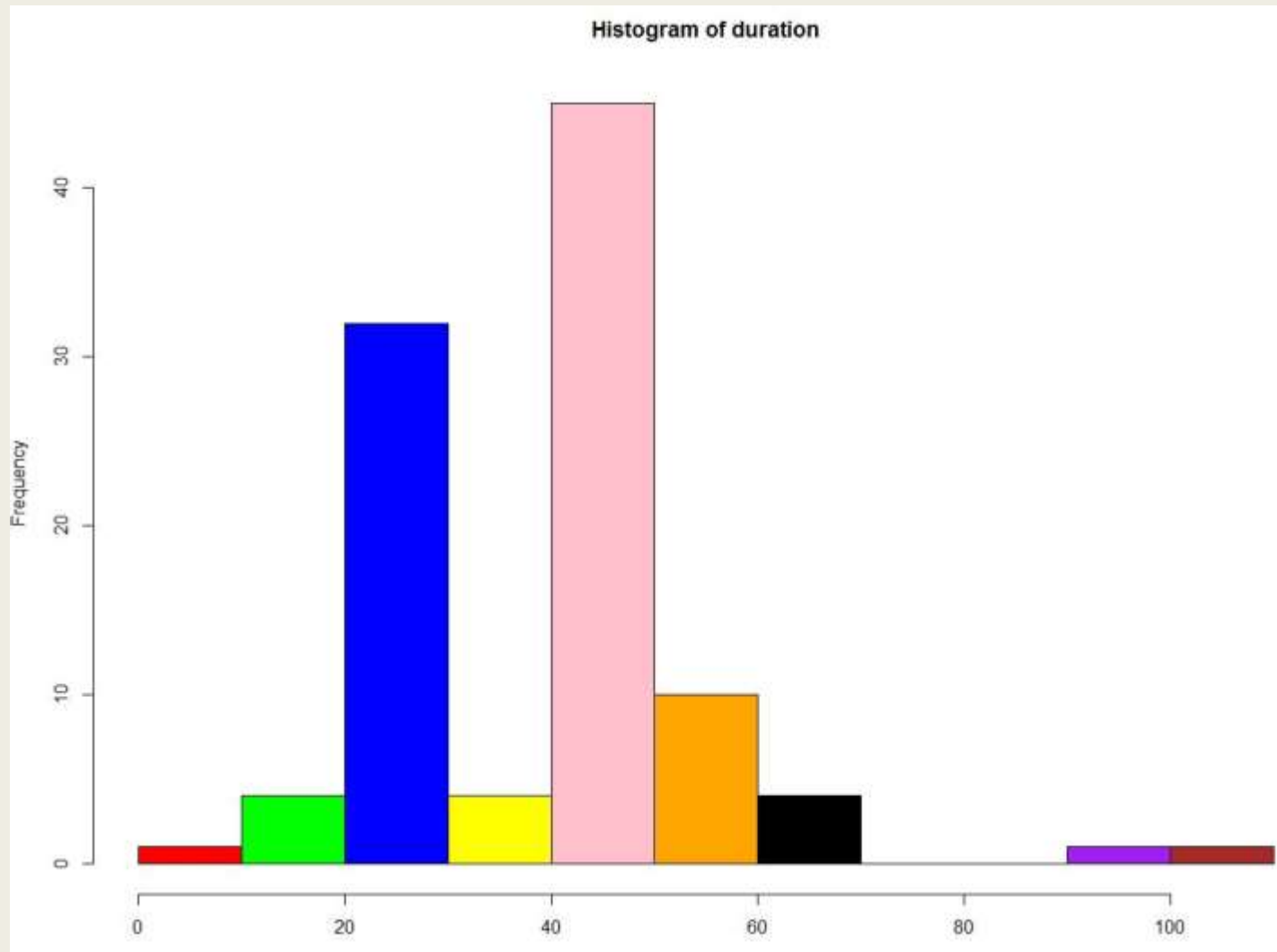
```
> x=Book1$SPF
> hist(Book1$SPF, col=colors)
>
```

Histogram of duration
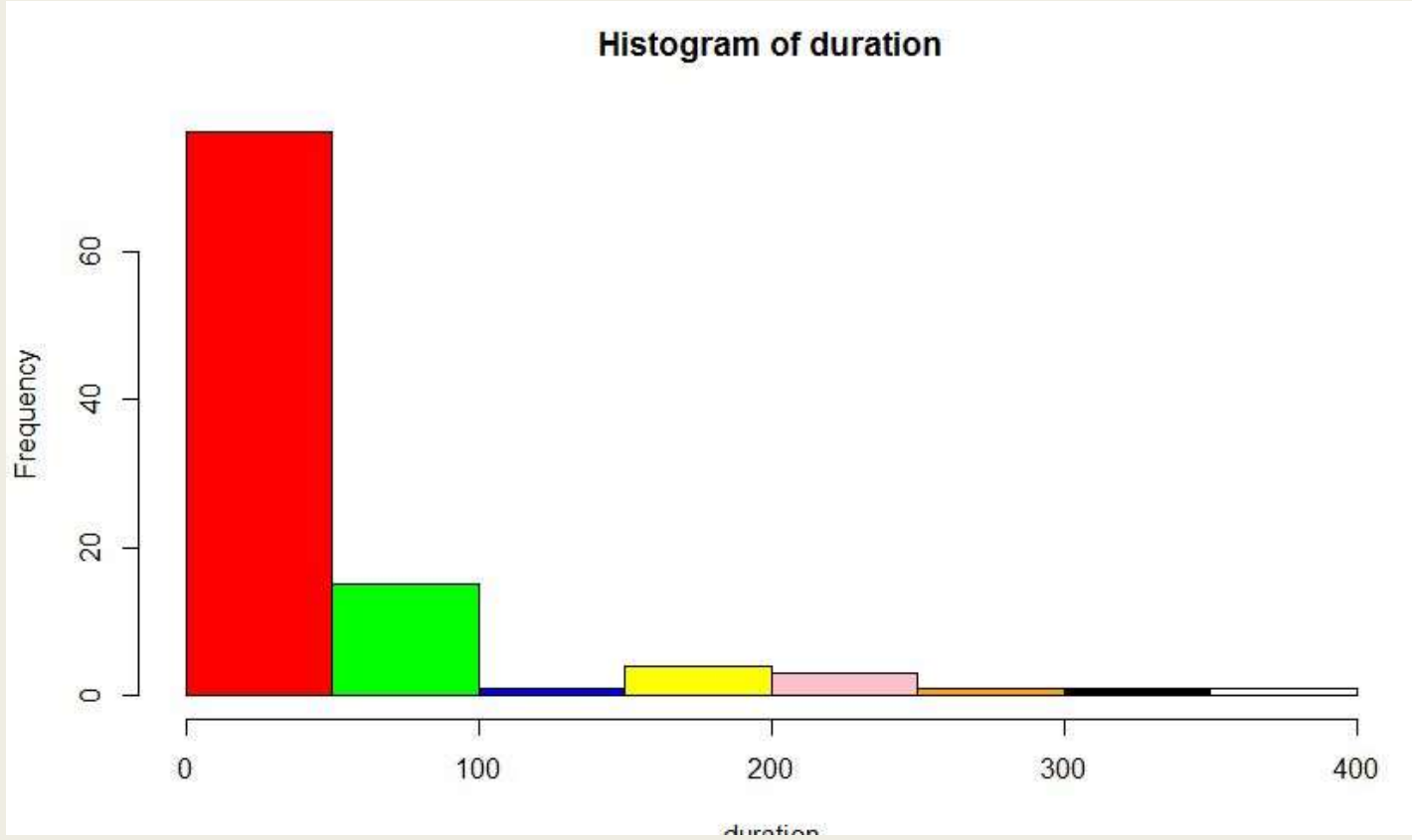
```
> hist(duration, col=colors)
> duration=Book1$Price
> hist(duration, col=colors)
>
```

Histogram of duration

```
> duration=Book1$Oz
> hist(duration, col=colors)
```

Social Media Statistics
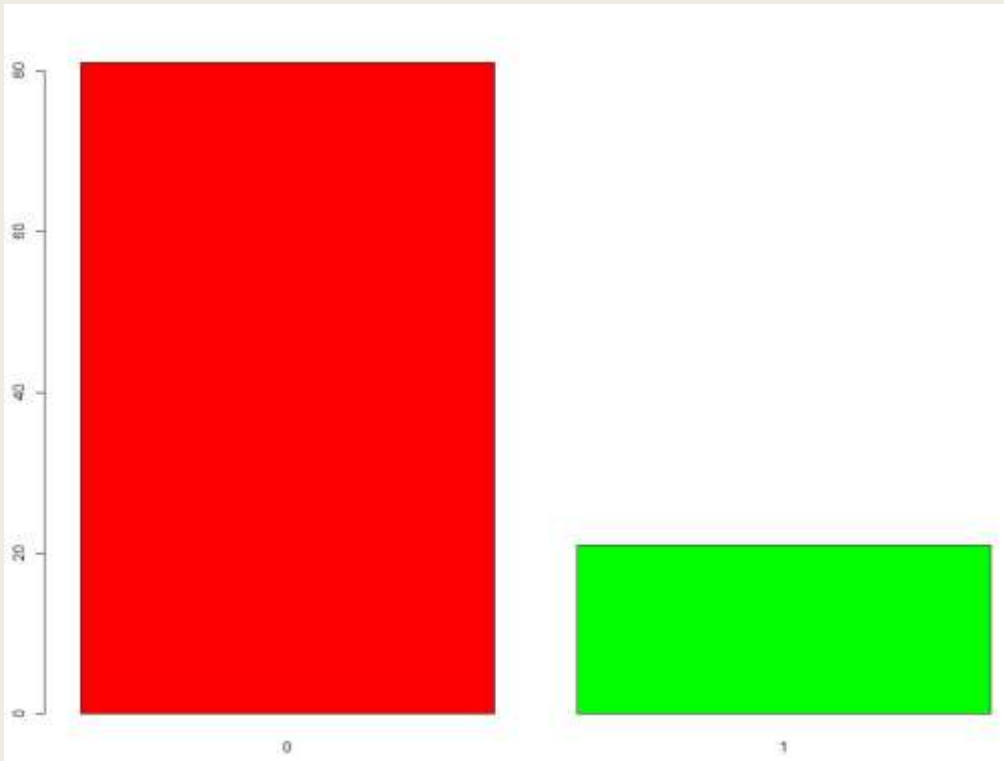
yFragrance/xpeople

yprice/xgender

Histogram of X11$SPFpep

Histogram of X11$Pricepep
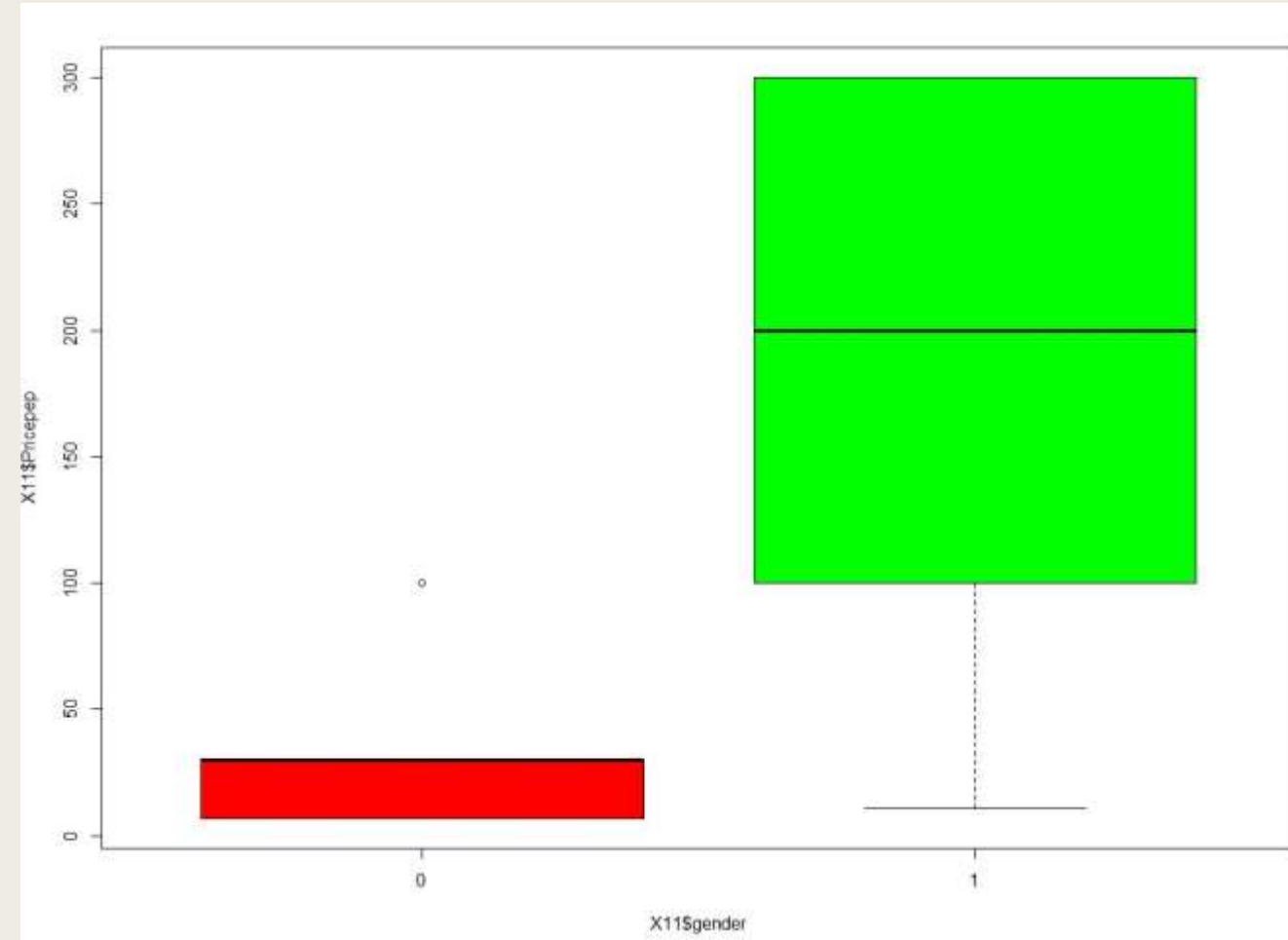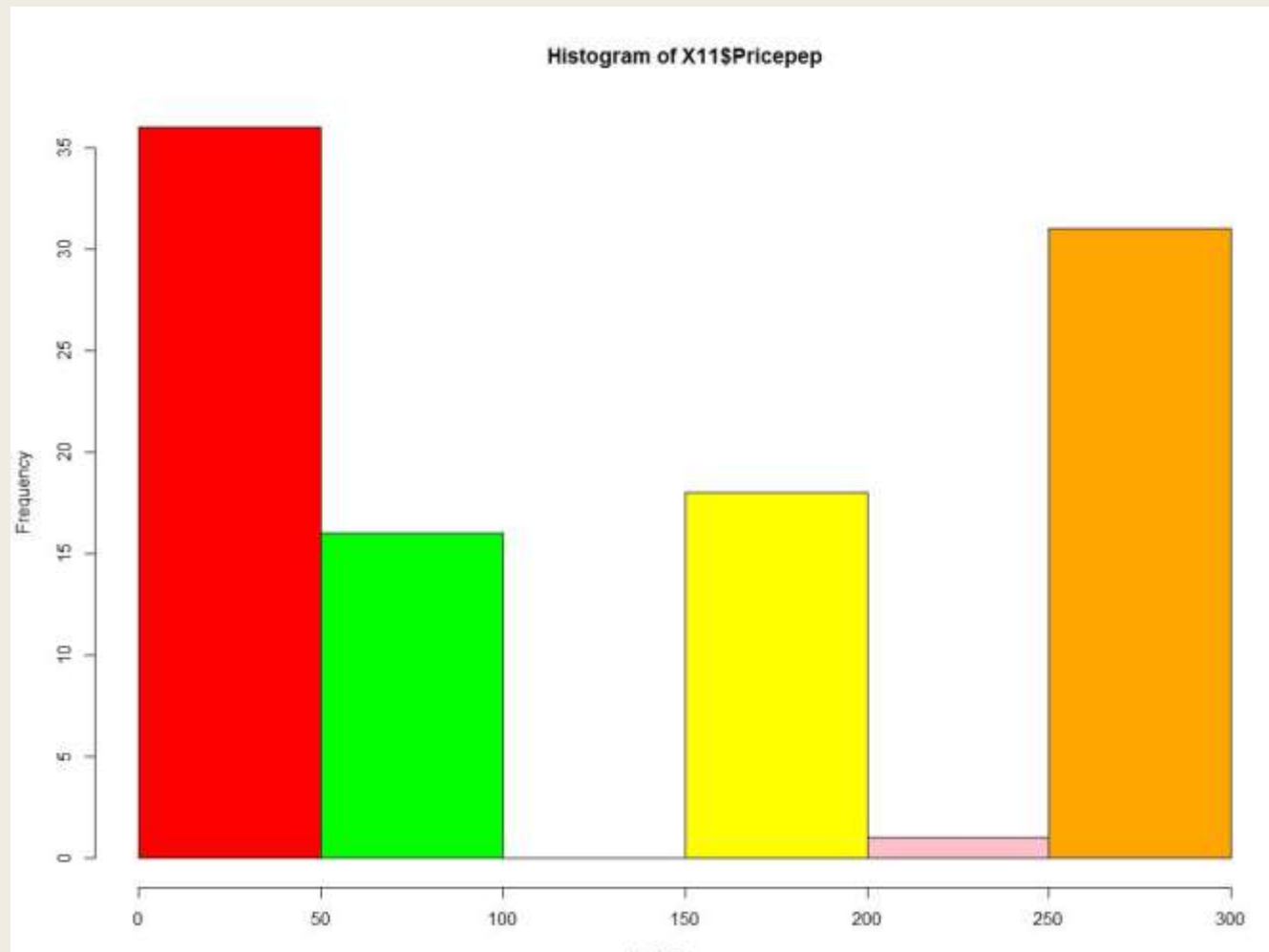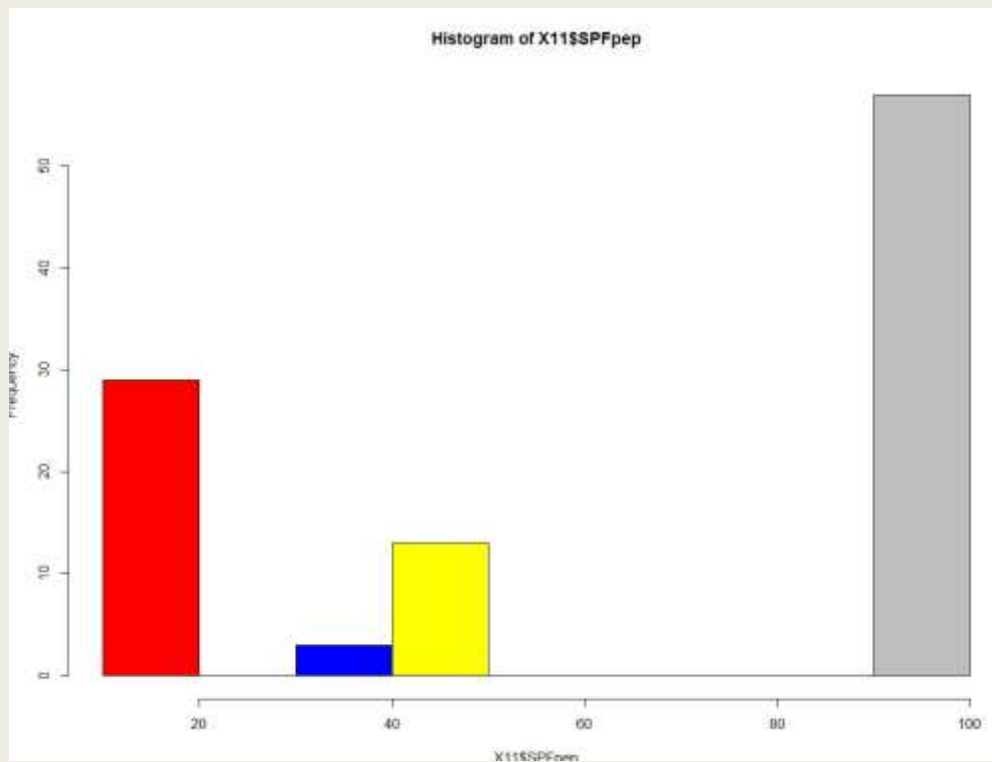
Range

```
> range(Book1$oz)
[1]   1.0 13.5
>
```

```
range(Book1$Price)
1]    0.66 400.00
```

```
range(Book1$UVA)
1]    2.5 43417.0
```

```
> range(Book1$Fragrance)
1] "0" "1"
> range(Book1$`Country of origin`)
1] "0" "7"
>
```

```
range(Book1$SPF)
1]    0 110
```

Steam & Leaf

```
> duration=Book1$SPF
> stem(duration)

The decimal point is 1 digit(s) to the right of the |

   0 | 0
   1 | 555
   2 | 057
   3 | 00000000000000000000000000000058
   4 | 0055567
   5 | 000000000000000000000000000000000000000000558
   6 | 0000000
   7 | 0000
   8 |
   9 |
  10 | 0
  11 | 0
```

Mean

```
> mean(Book1$UVA)
[1] 453.4775
```

```
> mean(Book1$SPF)
[1] 43.88235
>
```

```
> mean(Book1$Price)
[1] 54.50686
```

```
> mean(Book1$oz)
[1] 3.797647
```

Median

```
median(Book1$Price)
1] 29.285
```

```
> median(Book1$SPF)
[1] 50
```

```
> median(Book1$oz)
[1] 3.45
```

```
> median(Book1$UVA)
[1] 8.9
```

Mode

```
actual_mode <-table(Book1$Price)
names(actual_mode [actual_mode ==max(actual_mode)])
1] "20"
```

```
actual_mode <-table(Book1$SPF)
names(actual_mode [actual_mode ==max(actual_mode)])
1] "50"
```

```
actual_mode <-table(Book1$UVA)
names(actual_mode [actual_mode ==max(actual_mode)])
L] "25"
```

```
actual_mode <-table(Book1$`Country of Origin`)
names(actual_mode [actual_mode ==max(actual_mode)])
L] "7"
```

```
actual_mode <-table(Book1$Oz)
names(actual_mode [actual_mode ==max(actual_mode)])
1] "1.7"
```

Quartile

```
> quantile(Book1$UVA)
       0%       25%       50%       75%      100%
    2.500     6.700     8.900    17.275 43417.000
>
```

```
> quantile(Book1$SPF)
  0%   25%   50%   75%  100%
   0    30    50    50   110
>
```

```
> quantile(Book1$Price)
     0%     25%     50%     75%    100%
  0.660  17.810  29.285  53.375 400.000
>
```

```
> quantile(Book1$Oz)
     0%     25%     50%     75%    100%
   1.00    1.70    3.45    4.20   13.50
>
```
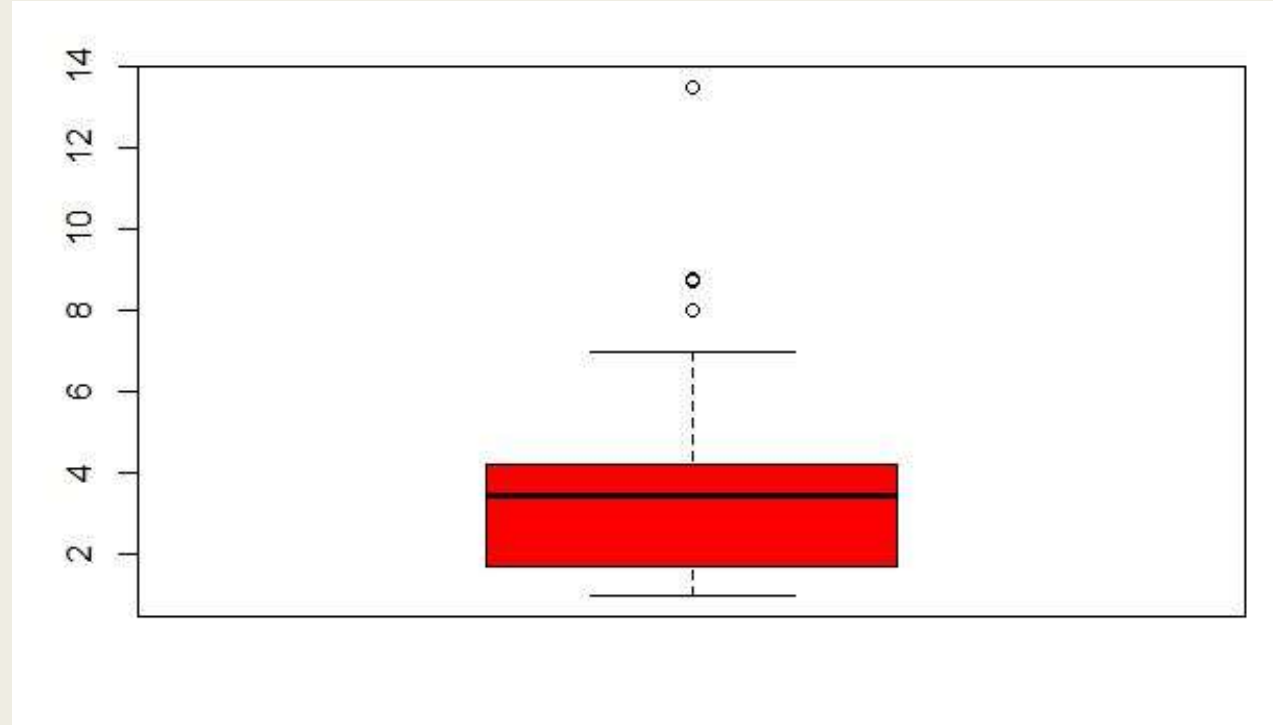
Box Plot
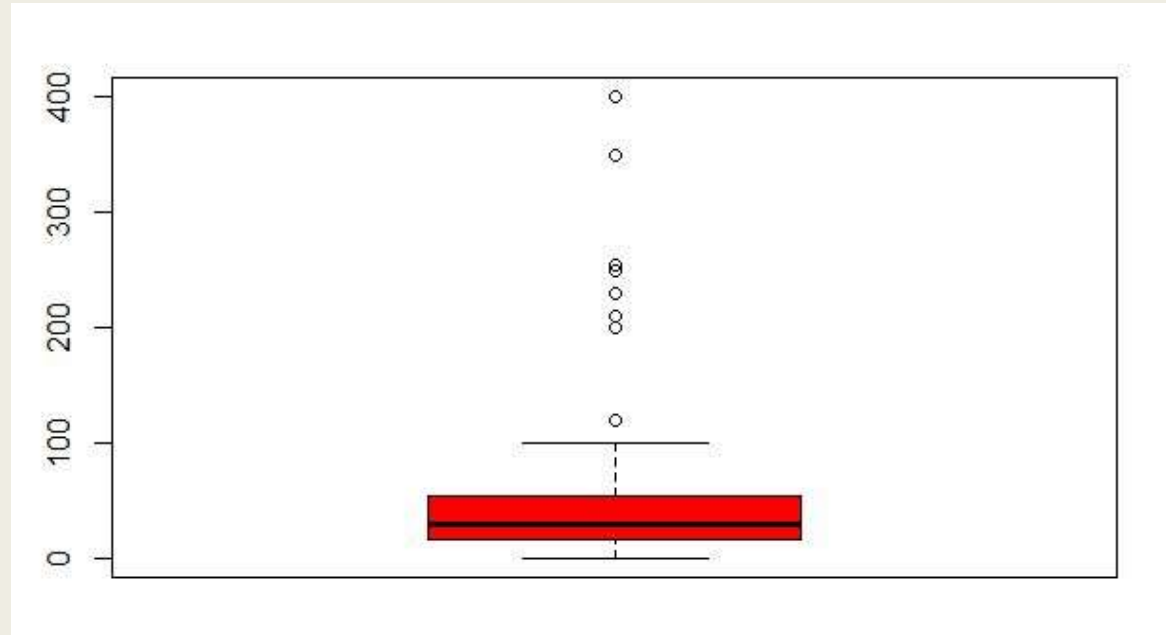

```
boxplot(Book1$Price, col=c("red"))
```
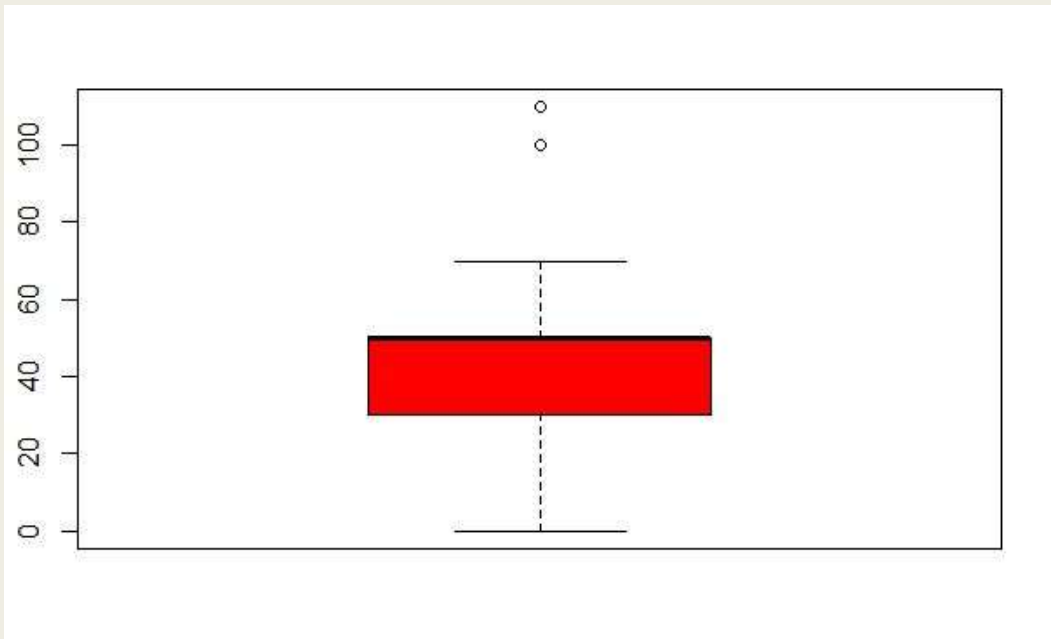
```
boxplot(Book1$SPF, col=c("red"))
```

```
boxplot(Book1$Oz, col=c("red"))
```

Var

```
>   var(Book1$UVA)
[1] 18479494
>
```

```
>  var(Book1$SPF)
[1] 253.4118
>
```

```
   var(Book1$Price)
1] 5183.458
```

```
  var(Book1$Oz)
1] 6.224228
```

CI

```
CI(x = Book1$SPF, ci = 0.95)
 upper      mean     lower
7.00912 43.88235 40.75558
```

```
CI(x = Book1$UVA, ci = 0.95)
   upper     mean     lower
.297.8376  453.4775 -390.8827
```

```
> CI(x = Book1$Oz)
   upper     mean    lower
4.287680 3.797647 3.307614
>
```

```
> CI(x = Book1$Price)
   upper     mean    lower
68.64827 54.50686 40.36546
>
```

One sample test

H0=equals to 100
H1=not equal to 100

```
data:   Book1$SPF
t = -35.603, df = 101, p-value < 2.2e-16
alternative hypothesis: true mean is not equal to 100
95 percent confidence interval:
 40.75558 47.00912
sample estimates:
mean of x
 43.88235

>
```

Two Sample test

H0=equal
H1=not

```
> t.test(Book1$SPF,Book1$Price, mu=0, var.equal = F, paired = F)

        Welch Two Sample t-test

data:  Book1$SPF and Book1$Price
t = -1.4552, df = 110.85, p-value = 0.1484
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -25.091876    3.842856
sample estimates:
mean of x mean of y
 43.88235   54.50686
```

Linear regression


```
> ablime(lm(X11$SPFpep~X11$Pricepep))
> mod<-lm(X11$SPFpep~X11$Pricepep)
> summary(mod)

Call:
lm(formula = X11$SPFpep ~ X11$Pricepep)

Residuals:
    Min      1Q  Median      3Q     Max
-34.335 -14.331  -8.714  18.374  45.461

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)   27.45095    3.10052   8.854 3.21e-14 ***
X11$Pricepep   0.27088    0.01623  16.685  < 2e-16 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 19.11 on 100 degrees of freedom
Multiple R-squared:  0.7357,    Adjusted R-squared:  0.7331
F-statistic: 278.4 on 1 and 100 DF,  p-value: < 2.2e-16

> plot(X11$SPFpep~X11$Pricepep)
> abline(lm(X11$SPFpep~X11$Pricepep))
>
```
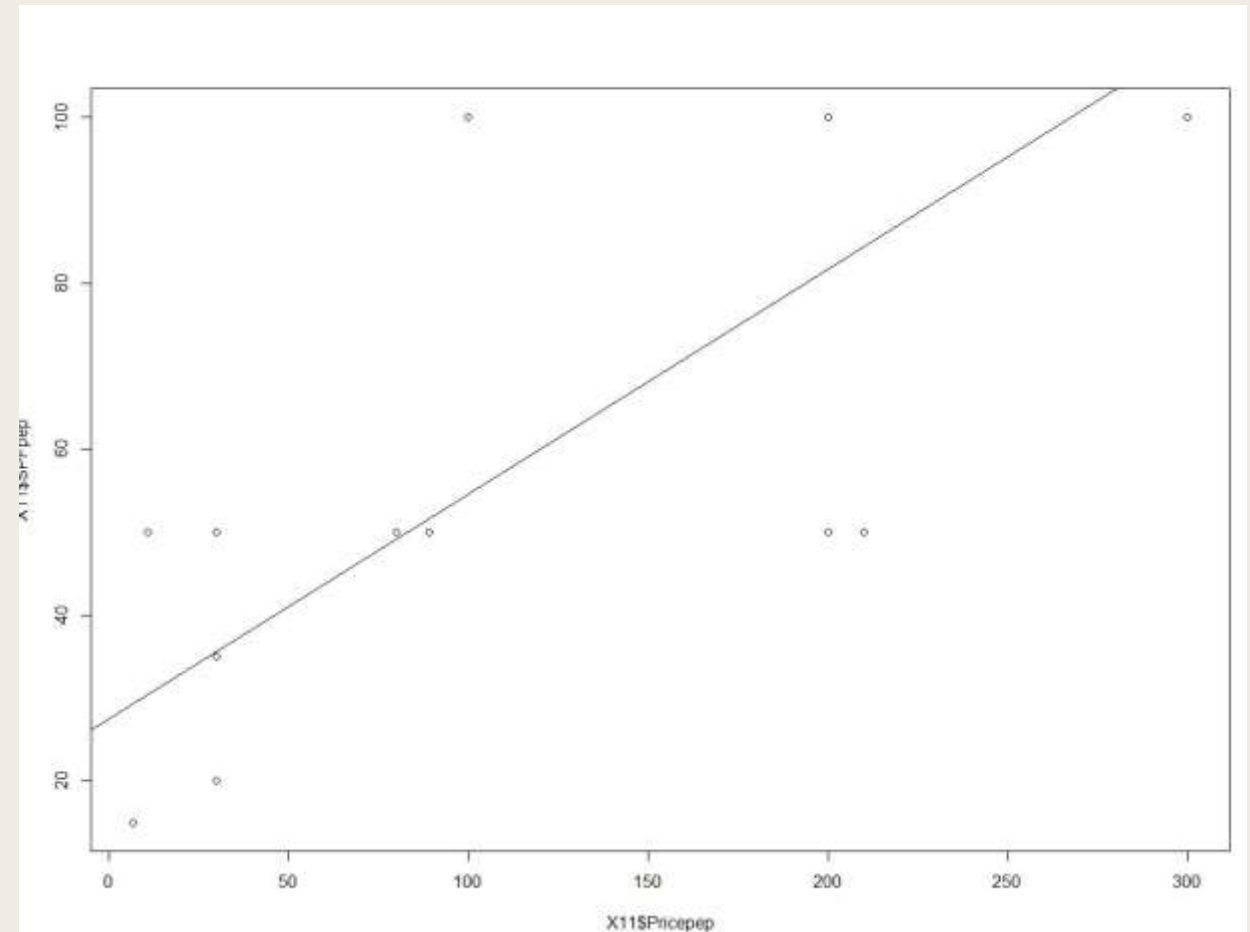
Chi square test

```
> chisq.test(X11$gender,X11$Fragpep, correct = FALSE)

        Pearson's Chi-squared test

data:  X11$gender and X11$Fragpep
X-squared = 13.222, df = 1, p-value = 0.0002766
```

rank

```
> wilcox.test(Book1$SPF,Book1$Price, paired = TRUE)

        Wilcoxon signed rank test with continuity correction

data:  Book1$SPF and Book1$Price
V = 3039.5, p-value = 0.1685
alternative hypothesis: true location shift is not equal to 0

> |
```

Thank you