MAT5007 – Applied Statistical Methods

Embedded Lab – R Statistical Software

FALL SEMESTER – 2022~2023 L25+L26 SLOT

E-RECORD

Assignment No.: 2

Submitted By

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SITE

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Date: 01/12/2022

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Experiment 1:

The following table gives the weight (x) (in 1000 lbs.) and highway fuel efficiency (y) (in miles/gallon) for a sample of 13 cars.

Vehicle	*X*	*Y*
Chevrolet Camaro	3.545	30
Dodge Neon	2.6	32
Honda Accord	3.245	30
Lincoln Continental	3.93	24
Oldsmobile Aurora	3.995	26
Pontiac Grand Am	3.115	30
Mitsubishi Eclipse	3.235	33
BMW 3-Series	3.225	27
Honda Civic	2.44	37
Toyota Camry	3.24	32
Hyundai Accent	2.29	37
Mazda Protégé	2.5	34
Cadillac DeVille	4.02	26

```
> carWeight = c(3.545, 2.6, 3.245, 3.93, 3.995, 3.115, 3.235, 3.225, 2.44, 3.24, 2.29, 2.5, 4.02)

> carWeight
```

```
> carweight = c(3.545, 2.6, 3.245, 3.93, 3.995, 3.115, 3.235, 3.225, 2.44, 3.24, 2.29, 2.5, 4.02)
> carweight
 [1] 3.545 2.600 3.245 3.930 3.995 3.115 3.235 3.225 2.440 3.240 2.290 2.500 4.020
```

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```
> fuelEfficiency = c(30, 32, 30, 24, 26, 30, 33, 27, 37, 32, 37, 34, 26)
> fuelEfficiency
```

```
> fuelEfficiency = c(30, 32, 30, 24, 26, 30, 33, 27, 37, 32, 37, 34, 26)
> fuelEfficiency
 [1] 30 32 30 24 26 30 33 27 37 32 37 34 26
```

Karl Pearson's Coefficient of Correlation

```
> cor(carWeight, fuelEfficiency, method="pearson")
> cor.test(carWeight, fuelEfficiency, method="pearson")
```

```
> cor(carWeight, fuelEfficiency, method="pearson")
[1] -0.8977642
> cor.test(carWeight, fuelEfficiency, method="pearson")

        Pearson's product-moment correlation

data:  carWeight and fuelEfficiency
t = -6.7598, df = 11, p-value = 3.116e-05
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 -0.9692870 -0.6862219
sample estimates:
       cor
-0.8977642
```

Interpretation: Since the Karl Pearson's coefficient of correlation is -0.8977642, it means that there is a negative correlation between the Car's weight and Car's fuel efficiency i.e. as car's weight increases the fuel efficiency goes down.

Spearman's Rank Correlation Coefficient

```
> cor(carWeight, fuelEfficiency, method="spearman")
> cor.test(carWeight, fuelEfficiency, method="spearman")
```

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```
> cor(carWeight, fuelEfficiency, method="spearman")
[1] -0.8488611
> cor.test(carWeight, fuelEfficiency, method="spearman")

        Spearman's rank correlation rho

data:  carWeight and fuelEfficiency
S = 672.99, p-value = 0.0002426
alternative hypothesis: true rho is not equal to 0
sample estimates:
       rho
-0.8488611
```

Interpretation: Since the Spearman's Rank Correlation Coefficient is -0.8488611, it means that there is a negative correlation between the Car's weight and Car's fuel efficiency i.e. as car's weight increases the fuel efficiency goes down.

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Experiment 2:

Find the Correlation between below data

ENJOY	BUY	READ
4	16	6
15	19	13
1	0	1
11	19	13
13	25	12
19	24	11
6	22	7
10	21	8
15	13	12
3	7	4
11	28	15
20	31	14
7	4	7
11	26	14
10	11	9
6	12	5
7	14	7
18	16	12
8	20	10
2	13	6
7	12	9
12	23	13
13	22	9
15	19	13
4	12	9
3	10	5
9	7	7
7	22	8
10	7	8
2	0	2
15	16	7
1	17	6

```
> enjoy = c(4, 15, 1, 11, 13, 19, 6, 10, 15, 3, 11, 20, 7, 11, 10, 6, 7, 18, 8, 2, 7, 12, 13, 15, 4, 3, 9, 7, 10, 2, 15, 1)
```

```
> buy = c(16, 19, 0, 19, 25, 24, 22, 21, 13, 7, 28, 31, 4, 26, 11, 12, 14, 16, 20, 13, 12, 23, 22, 19, 12, 10, 7, 22, 7, 0, 16, 17)
```

```
> read = c(6, 13, 1, 13, 12, 11, 7, 8, 12, 4, 15, 14, 7, 14, 9, 5, 7, 12, 10, 6, 9, 13, 9, 13, 9, 5, 7, 8, 8, 2, 7, 6)
```

```
> enjoy = c(4, 15, 1, 11, 13, 19, 6, 10, 15, 3, 11, 20, 7, 11, 10, 6, 7, 18, 8, 2, 7, 12, 13, 15, 4, 3, 9, 7, 10, 2, 15, 1)
> buy = c(16, 19, 0, 19, 25, 24, 22, 21, 13, 7, 28, 31, 4, 26, 11, 12, 14, 16, 20, 13, 12, 23, 22, 19, 12, 10, 7, 22, 7, 0, 16, 17)
> read = c(6, 13, 1, 13, 12, 11, 7, 8, 12, 4, 15, 14, 7, 14, 9, 5, 7, 12, 10, 6, 9, 13, 9, 13, 9, 5, 7, 8, 8, 2, 7, 6)
```

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```
> df = data.frame(enjoy, buy, read)
> df
```

```
> df = data.frame(enjoy, buy, read)
> df
   enjoy buy read
1      4  16    6
2     15  19   13
3      1   0    1
4     11  19   13
5     13  25   12
6     19  24   11
7      6  22    7
8     10  21    8
9     15  13   12
10     3   7    4
11    11  28   15
12    20  31   14
13     7   4    7
14    11  26   14
15    10  11    9
16     6  12    5
17     7  14    7
18    18  16   12
19     8  20   10
20     2  13    6
21     7  12    9
22    12  23   13
23    13  22    9
24    15  19   13
25     4  12    9
26     3  10    5
27     9   7    7
28     7  22    8
29    10   7    8
30     2   0    2
31    15  16    7
32     1  17    6
```

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Karl Pearson's Coefficient of Correlation

```
> cor(df, method="pearson")
```

```
> cor(df, method="pearson")
          enjoy       buy      read
enjoy 1.0000000 0.5936016 0.7785275
buy   0.5936016 1.0000000 0.7638331
read  0.7785275 0.7638331 1.0000000
```

Interpretation: The above matrix shows the correlations coefficients between the possible pairs of variables. We observe in this that buying a book is positively correlated to both enjoying (0.5936016) and reading (0.7638331) the book but reading more correlated to buying than enjoying.

Spearman's Rank Correlation Coefficient

```
> cor(df, method="spearman")
```

```
> cor(df, method="spearman")
          enjoy       buy      read
enjoy 1.0000000 0.5779296 0.8077434
buy   0.5779296 1.0000000 0.7056140
read  0.8077434 0.7056140 1.0000000
```

Interpretation: The above matrix shows the correlations coefficients between the possible pairs of variables. We observe in this that buying a book is positively correlated to both enjoying (0.5779296) and reading (0.7056140) the book but reading more correlated to buying than enjoying.

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