

民法-權力變動總論

繼上次之文義與體系，本次著墨於歷史、目的性、限縮與擴張之解釋，並以探討刑201之肇事罪之沿革、法益、修法方向做為整合性之收尾。

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觀念複習

Mean:

μ = 平均值

$$\mu \text{ or } \bar{x} = \frac{1}{n} \sum_{i=1}^n x_i$$

Weighted mean:

$$\bar{x} = \frac{\sum_{i=1}^n w_i \cdot x_i}{\sum_{i=1}^n w_i}$$

可以反映每個值的重要性

其中的 w_i 是權重

幾何平均數

$$\bar{x}_g = \sqrt[n]{x_1 \cdot x_2 \cdot \dots \cdot x_n}$$

他通常被拿來做成長率:

$$R = 1 + (\bar{x}_g + x_l)$$

percentiles 百分位數

先算出pth再分位數的位置

$$L_p = \frac{p(n+1)}{100}$$

再求百分位數的「值」

Q_1 = 25th百分位數

Q_3 = 75th百分位數

Interquartile Range四分位距

$$IQR = Q_3 - Q_1$$

variance 變異數

$$\text{母體變異數} : \sigma^2 = \frac{1}{N} \sum_{i=1}^N (x_i - \mu)^2$$

$$\text{樣本變異數} : s^2 = \frac{1}{n-1} \sum_{i=1}^n (x_i - \bar{x})^2$$

改寫一下

$$\sum_{i=1}^n x_i^2 = (n-1)s^2 + n\bar{x}^2$$

$$s^2 = \frac{1}{n-1} \sum_{i=1}^n (x_i - \bar{x})^2$$

coefficient of variation 變異係數

$$\frac{\sigma(s)}{\mu(x)}$$

Z分數

$$Z_i = \frac{x_i - \mu}{\sigma}$$

某資料點(x_i)與某中位數(\bar{x})相距幾個標準差

```
| $Z_i = \frac{x_i - \mu}{\sigma}$
```

Chebyshev's Theorem 切比雪夫不等式：

$$1 - \frac{1}{z^2} (z > 1)$$

至少有 $1 - \frac{1}{z^2}$ 在 z_i 分數內

Empirical rule

- 1.幾乎68%的data與中位數相差在1個標準差之內
- 2.幾乎95%的data與中位數相差在2個標準差之內
- 3.almost all的data與中位數相差在3個標準差之內

outlier 異常值

$$\text{LowerLimit} = Q1 - 1.5(\text{IQR})$$

$$\text{UpperLimit} = Q3 + 1.5(\text{IQR})$$

covariance 共變異程度

$$\text{母體共變異} : \sigma_{xy} = \frac{1}{N} \sum_{i=1}^N (x_i - \mu_X)(y_i - \mu_Y)$$

樣本共變異： $s_{xy} = \frac{1}{n-1} \sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})$

Correlation Coefficient 相關係數

母體： $\rho_{xy} = \frac{s_{xy}}{\sigma_X \sigma_Y}$

樣本： $r_{xy} = \frac{\text{Cov}(X, Y)}{s_X s_Y}$

是
目

52：boxplot與綜合觀念

```
ex52<-read.xlsx("Ch3/CellService.xlsx")
DT::datatable(
  ex52
)
```

Show

10
▼

entries

Search:

	City	AT&T	Sprint	T-Mobile	Verizon
1	Atlanta	70	66	71	79
2	Boston	69	64	74	76
3	Chicago	71	65	70	77
4	Dallas	75	65	74	78
5	Denver	71	67	73	77
6	Detroit	73	65	77	79
7	Jacksonville	73	64	75	81
8	Las Vegas	72	68	74	81
9	Los Angeles	66	65	68	78
10	Miami	68	69	73	80

Showing 1 to 10 of 20 entries

Previous

1
2

Next

```
summary(ex52$`T-Mobile`)
```

Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
68.00	71.75	73.50	73.15	74.25	77.00

```
ex52_1<-  
  ex52%>%  
  select(`T-Mobile`,`AT&T`,Sprint,Verizon)  
ex52_2<-  
  ex52_1%>%  
  pivot_longer(c(`T-Mobile`,`AT&T`,Sprint,Verizon),names_to = "店名",  
               values_to = "Rating")  
datatable(ex52_2)
```

Show entries

Search:

	店名	Rating
1	T-Mobile	71
2	AT&T	70
3	Sprint	66
4	Verizon	79
5	T-Mobile	74
6	AT&T	69
7	Sprint	64
8	Verizon	76
9	T-Mobile	70
10	AT&T	71

Showing 1 to 10 of 80 entries

Previous

1

2

3

4

5

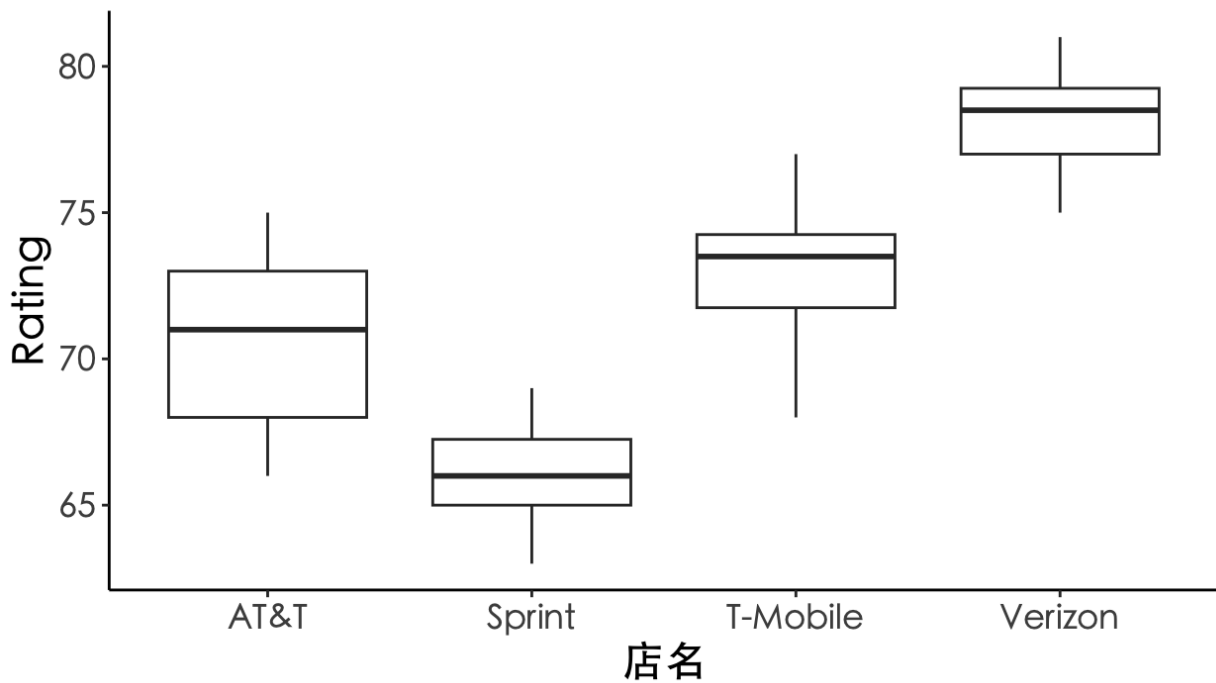
...

8

Next

```
ggplot(ex52_2,aes(x=店名,y=Rating))+  
  geom_boxplot()+  
  theme_classic()+  
  labs(title= "ex52:boxplot")+  
  theme(text=element_text(family="黑體-繁 中黑", size=16))
```

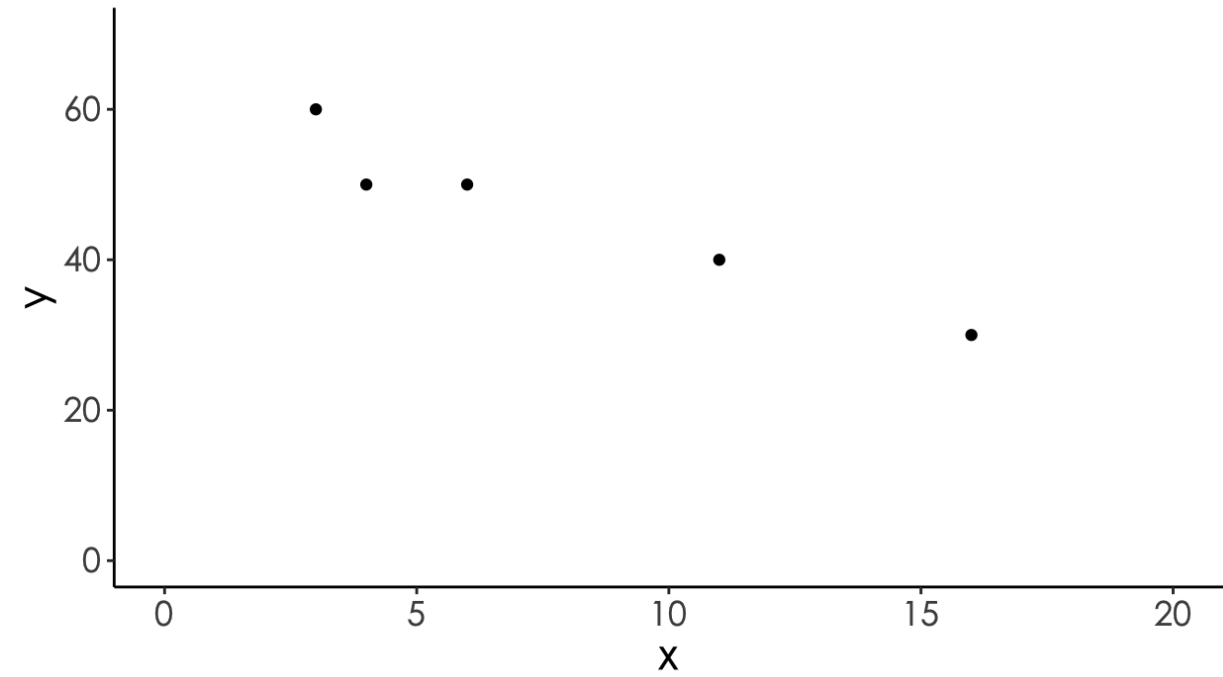
ex52:boxplot



第55題：共變異與相關係數

```
ex55<-  
  tibble(  
    x= c(4,6,11,3,16),  
    y= c(50,50,40,60,30)  
  )  
  
ggplot(ex55,aes(x=x,y=y))+  
  geom_point()+  
  theme_classic()+  
  labs(title= "ex55:scatterplot")+  
  theme(text=element_text(family="黑體-繁 中黑", size=16))+  
  coord_cartesian(ylim = c(0, 70),xlim=c(0,20))
```

ex55:scatterplot



```
ex55_c<-
  ex55%>%
  mutate( x的離差 = x-mean(x), y的離差 = y-mean(y) , s = y的離差*x的離差)

datatable(
  ex55_c
)
```

Show

10 ▾

 entries

Search:

	x ▴ ▾	y ▴ ▾	x的離差 ▴ ▾	y的離差 ▴ ▾	s ▴ ▾
1	4	50	-4	4	-16
2	6	50	-2	4	-8
3	11	40	3	-6	-18
4	3	60	-5	14	-70
5	16	30	8	-16	-128

```
S_covariance<-sum(ex55_c$s)/(5-1)
S_covariance
```

```
[1] -60
```

```
rx <- S_covariance/(sd(ex55_c$x)*sd(ex55_c$y))  
rx
```

```
[1] -0.9688768
```

ex5

Consider a sample with data values of 27, 25, 20, 15, 30, 34, 28, and 25. Compute the 20th, 25th, 65th, and 75th percentiles.

1. recall

$$L_p = p / 100 (n+1)$$

(p = 位置、n = 數字數)

2. arrange the data

15 20 25 25 27 28 30 34

3. Compute

$$\begin{aligned} 20\text{th} &= (20 / 100)(8+1) = 9/5 = 1.8, \\ 15 + (20-15) * 0.8 &= 19 \end{aligned}$$

$$\begin{aligned} 25\text{th} &= (25/100)(8+1) = 2.25, \\ 20 + (25-20) * 0.25 &= 21.25 \end{aligned}$$

$$\begin{aligned} 65\text{th} &= (65/100)(9) = 5.85, \\ 27 + (28-27) * 0.85 &= 27.85 \end{aligned}$$

...

ex6

Consider a sample with data values of 53, 55, 70, 58, 64, 57, 53, 69, 57, 68, and 53. Compute the mean, median, and mode.

1. arrange

53 53 53 55 57 57 58 64 68 69 70

1. mode = 53

2. mean = $657/11 = 59.72727$

3. median = 57

ex10

```
data = 42 66 67 71 78 62 61 76 71 67 61 64 61 54 83 63 68 69 81 53
```

1.arrange

n = 20

```
y = c(42, 66, 67, 71, 78, 62, 61, 76, 71, 67, 61, 64, 61, 54, 83, 63, 68, 69, 81, 53)
x <- y[order(y)]
x
```

```
[1] 42 53 54 61 61 61 62 63 64 66 67 67 68 69 71 71 76 78 81 83
```

a.Compute the mean, median, and mode.

```
summary(x)
```

Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
42.0	61.0	66.5	65.9	71.0	83.0

b.Compute the first and third quartiles.

c.Compute and interpret the 90th percentile.


90th = $0.921 = 18.9$

$78 + 0.93 = 80.7$

ex21

ex70

Best Hotels. Travel + Leisure magazine provides an annual list of the 500 best hotels in the world. The magazine provides a rating for each hotel along with a brief description that includes the size of the hotel, amenities, and the cost per night for a double room. A sample of 12 of the top-rated hotels in the United States follows.

Show  entries

Search:

	Hotel	Location	Rooms	Cost/Night
1	Boulders Resort & Spa	Phoenix, AZ	220	499
2	Disney's Wilderness Lodge	Orlando, FL	727	340
3	Four Seasons Hotel Beverly Hills	Los Angeles, CA	285	585
4	Four Seasons Hotel	Boston, MA	273	495
5	Hay-Adams	Washington DC	145	495
6	Inn on Biltmore Estate	Ashville, NC	213	279
7	Loews Ventana Canyon Resort	Phoenix, AZ	398	279
8	Mauna Lani Bay Hotel	Island of Hawaii	343	455
9	Montage Laguna Beach	Laguna Beach, CA	250	595
10	Sofitel Water Tower	Chicago, IL	414	367

Showing 1 to 10 of 12 entries

Previous

1

2

Next

a:What is the mean number of rooms?

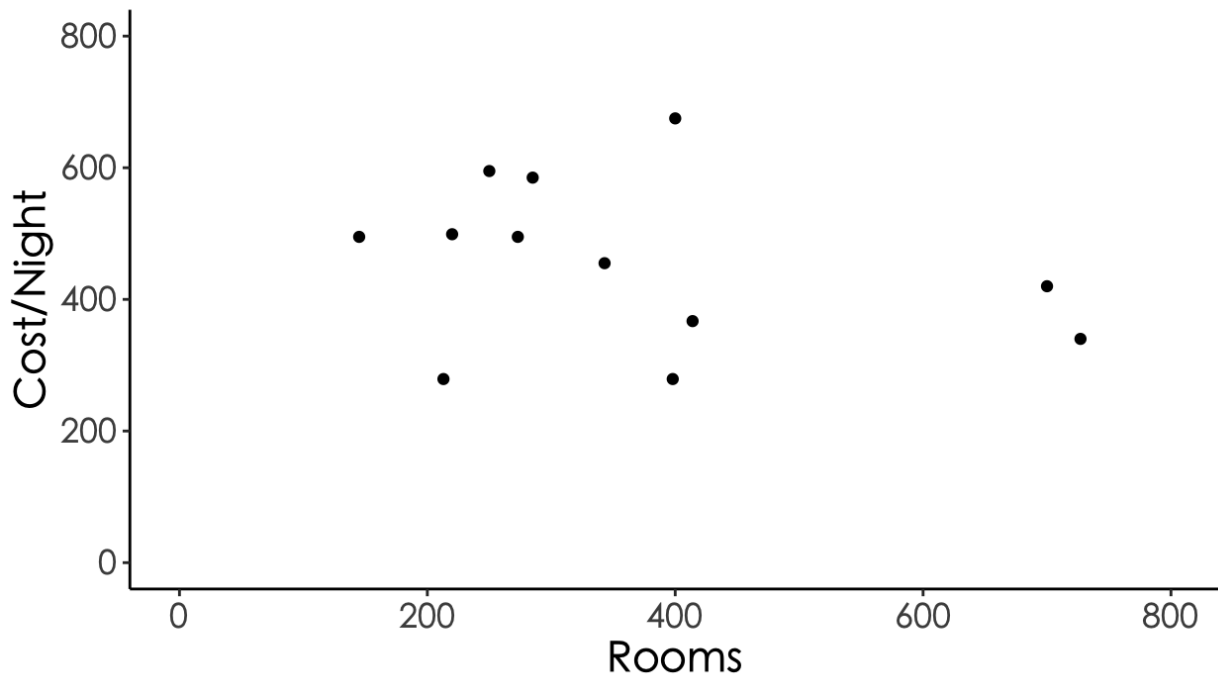
[1] 364

What is the mean cost per night for a double room?

[1] 457

Develop a scatter diagram with the number of rooms on the horizontal axis and the cost per night on the vertical axis. Does there appear to be a relationship between the number of rooms and the cost per night? Discuss.

ex55:scatterplot



it is difficult to see much of a relationship. When the number of rooms becomes larger, there is no indication that the cost per night increases. The cost per night may even decrease slightly.

ex73

Money Market Funds Days to Maturity. The days to maturity for a sample of five money market funds are shown here. The dollar amounts invested in the funds are provided. Use the weighted mean to determine the mean number of days to maturity for dollars invested in these five money market funds.

這題要做的是dollars invested，所以是以days to maturity為權重