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> # 2020/12/11(五), 109 學年第一學期 資料科學應用 R 期中考
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> #
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> # 本檔案為各題之程式碼檔，無執行結果
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```
> # ex1(a)
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```
> Eng.hr <- rep(13:17, 5)
```

```
> Comp.hr <- rep(8:12, each=5)
```

```
> study <- function(x, y){
```

```
+ 
```

```
+   Tuition <- 400*x + 600*y
```

```
+   U <- sqrt(x)*sqrt(y)
```

```
+   Fit <- ifelse(Tuition <= 12000,"*", " ")
```

```
+   study1 <- data.frame(Eng.hr, Comp.hr, Tuition, U, Fit)
```

```
+   study1
```

```
+ }
```

```
> study(Eng.hr, Comp.hr)
```

	Eng.hr	Comp.hr	Tuition	U	Fit
1	13	8	10000	10.19804	*
2	14	8	10400	10.58301	*
3	15	8	10800	10.95445	*
4	16	8	11200	11.31371	*
5	17	8	11600	11.66190	*
6	13	9	10600	10.81665	*
7	14	9	11000	11.22497	*
8	15	9	11400	11.61895	*
9	16	9	11800	12.00000	*
10	17	9	12200	12.36932	
11	13	10	11200	11.40175	*
12	14	10	11600	11.83216	*
13	15	10	12000	12.24745	*
14	16	10	12400	12.64911	
15	17	10	12800	13.03840	

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16      13      11  11800 11.95826  *
17      14      11  12200 12.40967
18      15      11  12600 12.84523
19      16      11  13000 13.26650
20      17      11  13400 13.67479
21      13      12  12400 12.49000
22      14      12  12800 12.96148
23      15      12  13200 13.41641
24      16      12  13600 13.85641
25      17      12  14000 14.28286
> #for(Eng.hr in 13:17){
> # for(Comp.hr in 8:12){
> #cat(study(Eng.hr, Comp.hr), "\n")}}
> #for(Comp.hr in 8:12){
> #for(Eng.hr in 13:17){
> #cat(c(Eng.hr, Comp.hr), "\n")}}
>
> #ex2(a)
> library(readxl)
> data <- read_excel("data/Score-109.xlsx", na="NA")
New names:
* `` -> ...2
* `` -> ...3
> head(data, 6, skip=2)
# A tibble: 6 x 3
  `109-1 Department of Mathematics` ...2      ...3
  <chr>                                <chr>    <chr>
1 ID                                  Calculus English
2 No.1                               72       62
3 No.2                               88       97
4 No.3                               76       66
5 No.4                               89       51
6 No.5                               46       15
> tail(data, 5)
# A tibble: 5 x 3
  `109-1 Department of Mathematics` ...2      ...3
  <chr>                                <chr> <chr>
1 No.71                               69    96

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2 No.72                    51    100
3 No.73                    37    50
4 No.74                    33    92
5 No.75                    4     37
>
> #ex2(b)
> str(data)
tibble [76 x 3] (S3: tbl_df/tbl/data.frame)
  $ 109-1 Department of Mathematics: chr [1:76] "ID" "No.1" "No.2" "No.3" ...
  $ ...2                          : chr [1:76] "Calculus" "72" "88" "76" ...
  $ ...3                          : chr [1:76] "English" "62" "97" "66" ...
> colnames(data) <- c("ID", "Calculus", "English")
> data$Calculus <- as.numeric(data$Calculus)
Warning message:

```

強制變更過程中產生了 NA

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> data$English <- as.numeric(data$English)
Warning message:

```

強制變更過程中產生了 NA

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> data[is.na(data)] <- 0
> id <- which(data$Calculus < 60 & data$English < 60)
> data[id,]
# A tibble: 24 x 3
   ID      Calculus English
  <chr>    <dbl>    <dbl>
1 ID              0      0
2 No.5           46     15
3 No.7           32     51
4 No.8           51      0
5 No.11          3      0
6 No.15          39      6
7 No.18          40      0
8 No.21          45     51
9 No.26          39     29
10 No.30         48     52
# ... with 14 more rows
>

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> #ex2(c)
> my.cor <- function(x, y){
+
+   x.bar <- mean(x)
+   y.bar <- mean(y)
+   a <- x - x.bar
+   b <- y - y.bar
+   c <- sqrt(sum((x-x.bar)^2))
+   d <- sqrt(sum((y-y.bar)^2))
+   r <- sum(a*b) / (c*d)
+   r
+ }
> my.cor(data$Calculus, data$English)
[1] 0.01055664
>
> #ex2(d)
> cor(data$Calculus, data$English)
[1] 0.01055664
>
> #ex3(a)
> my.dnorm <- function(x,  $\mu=0$ ,  $\sigma=1$ ){
+
+   a <- (x- $\mu$ )^2 / 2*( $\sigma$ ^2)
+   exp(-a)
+   b <- sqrt(2*pi)* $\sigma$ 
+   d <- exp(-a)/b
+   d
+ }
> my.dnorm(2.5, 3, 2)
[1] 0.1209854
>
> #ex3(b)
> x <- -3:3
> dnorm <- dnorm(x)
> my.dnorm <- my.dnorm(x)
> data.frame(x, my.dnorm, dnorm)
   x    my.dnorm    dnorm
1 -3 0.004431848 0.004431848

```

2 -2 0.053990967 0.053990967
3 -1 0.241970725 0.241970725
4 0 0.398942280 0.398942280
5 1 0.241970725 0.241970725
6 2 0.053990967 0.053990967
7 3 0.004431848 0.004431848
>