```
# 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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> #ex.1
> study <- function(x, y){
+     #x <- 13
+     #y <- 8
+     #預算限制式
+     Eng.hr <- x
+     #Eng.hr
+     Comp.hr <- y
+     #Comp.hr
+     Tuition <-    ((400*x) + (600*y) )
+     #Tuition
+     ifelse((limt <= 12000), limt, 0)
+     #limt
+     #效用函數
+     U <- sqrt(x)*sqrt(y)
+     #U
+     Fit <- ifelse(Tuition <=12000, "*"," ")
+
+     study.table <- data.frame(Eng.hr, Comp.hr, Tuition, U, Fit)
+     study.table
+ }
>
> x <- rep(13:17, 5)
> y <- rep(8:12,    each=5)
> study(x, y)
    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
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
>
>
> #ex.2(a)
> library(readxl)
> student_test <- read_excel("data/Score-109.xlsx",    na = "NA", skip=1)
> student_test
# A tibble: 75 x 3
   ID       Calculus English
   <chr>       <dbl>   <dbl>
 1 No.1           72      62
 2 No.2           88      97
 3 No.3           76      66
 4 No.4           89      51
 5 No.5           46      15
 6 No.6           16      87
 7 No.7           32      51
 8 No.8           51       0
 9 No.9           73       1
10 No.10          99      14
# ... with 65 more rows
> #印出前後五筆資料
```

```
> head(student_test, 5)
# A tibble: 5 x 3
   ID       Calculus English
   <chr>       <dbl>     <dbl>
1 No.1           72        62
2 No.2           88        97
3 No.3           76        66
4 No.4           89        51
5 No.5           46        15
> tail(student_test, 5)
# A tibble: 5 x 3
   ID       Calculus English
   <chr>       <dbl>     <dbl>
1 No.71          69        96
2 No.72          51       100
3 No.73          37        50
4 No.74          33        92
5 No.75           4        37
>
>
> #ex.2(b) 印出"請問有哪些同學兩科成績同時不及格
> #將遺失值填入 0
> student_test[is.na(student_test)] <- 0
> student_test
# A tibble: 75 x 3
     ID       Calculus English
     <chr>       <dbl>     <dbl>
 1 No.1           72        62
 2 No.2           88        97
 3 No.3           76        66
 4 No.4           89        51
 5 No.5           46        15
 6 No.6           16        87
 7 No.7           32        51
 8 No.8           51         0
 9 No.9           73         1
10 No.10          99        14
# ... with 65 more rows
```

```
> id <- which((student_test$Calculus+ student_test$English) < 60)
> student_test[id, ]
# A tibble: 15 x 3
   ID       Calculus English
   <chr>       <dbl>   <dbl>
 1 No.8           51       0
 2 No.11           3       0
 3 No.15          39       6
 4 No.18          40       0
 5 No.33          18       0
 6 No.35          37      21
 7 No.39           0      38
 8 No.45          26      32
 9 No.47           6      52
10 No.48           4       9
11 No.53          31      18
12 No.54          21      28
13 No.56          50       3
14 No.68          15      21
15 No.75           4      37
>
> #ex.2(c)  寫相關係數函數
> x1 <- student_test$Calculus
> x2 <- student_test$English
>
> my.cor <- function(x1, x2){
+
+     # x1 <- 5
+     # x2 <- 10
+     x1.bar <- mean(x1)
+     x2.bar <- mean(x2)
+
+     a <- sum((x1- x1.bar)*(x2 - x2.bar))
+     b <- sqrt(sum((x1- x1.bar)^2)) * sqrt(sum((x2 - x2.bar)^2))
+     ans <- a/b
+     ans
+ }
>
```

```
> x1 <- student_test$Calculus
> x2 <- student_test$English
> my.cor(x1, x2)
[1] -0.02334661
>
> #ex.2(d)  計算微積分及英文兩成績之相關係數
> x1 <- student_test$Calculus
> x2 <- student_test$English
> my.cor(x1, x2)
[1] -0.02334661
>
> cor(x1, x2)
[1] -0.02334661
>
>
> #ex.3(a)
> my_dnorm <- function(x, u = 0, z = 1){
+     #x <- 1
+     #u <- 0
+     #z <- 1
+     e <- 2.718282
+     density <- (1/(sqrt(2*pi)*z))*e^(-(x-u)^2/2*z)
+     density
+
+ }
> my_dnorm(2.5, 3, 2)
[1] 0.1553483
>
> #ex.3(b)
> x <- rep(-3:3)
> dnorm <- my_dnorm(x, 3, 2)
> my.dnorm <- my_dnorm(x, 3, 2)
> my.dnorm.table <-data.frame(x, dnorm, my.dnorm)
> my.dnorm.table
  x              dnorm          my.dnorm
1 -3 4.626768e-17 4.626768e-17
2 -2 2.770240e-12 2.770240e-12
3 -1 2.244750e-08 2.244750e-08
```

```
4  0 2.461668e-05 2.461668e-05
5  1 3.653440e-03 3.653440e-03
6  2 7.338133e-02 7.338133e-02
7  3 1.994711e-01 1.994711e-01
>
```