2.14.5. Exercise

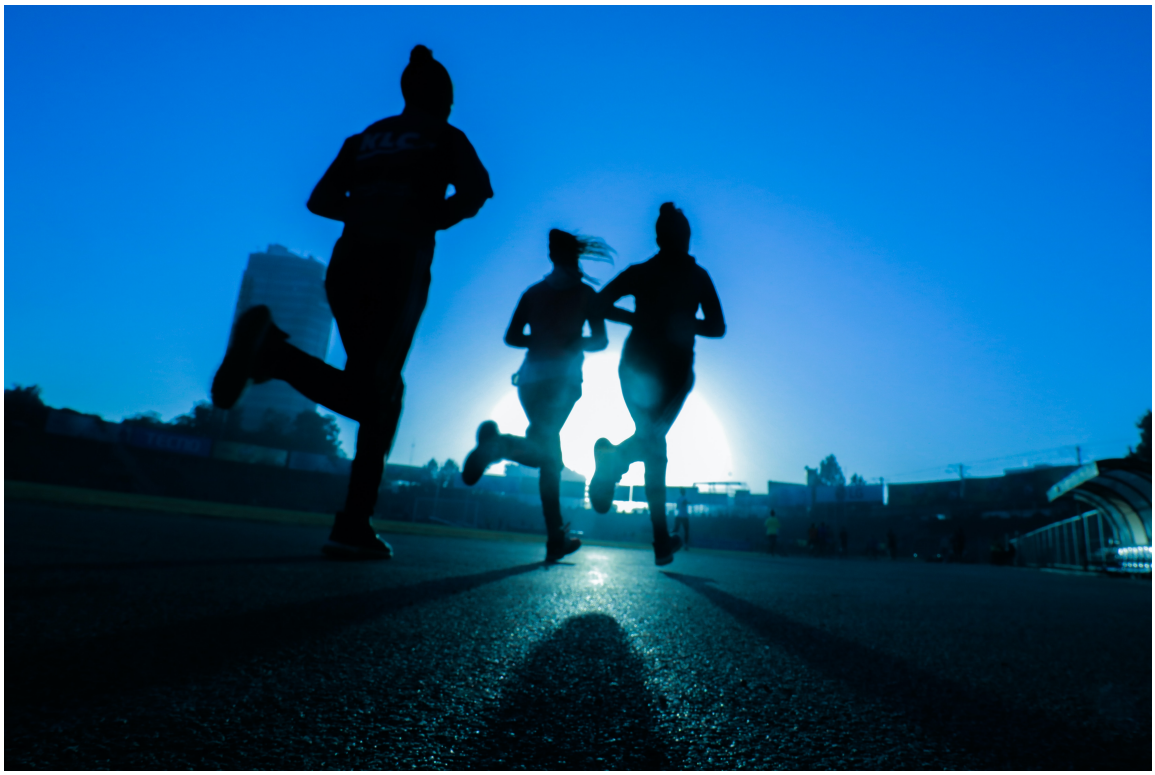

Fig. 2.14.5.1 Photo by Fitsum Admasu on Unsplash

Note

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2.14.5.1. Book: 菲絲恩教您學會Python，第2版，2014

2.14.5.1.1. Ex1

1. Question+Code

> **Question** **Code**

金字塔是世界七大奇景之一，
請利用for迴圈寫出如下圖所示的4層金字塔圖形。

```
   *
  * *
 * * *
* * * *
```

2.14.5.1.2. Ex2

1. Question+Code

Question **Code**

請寫一支程式能夠輸入兩個數字，然後輸出這兩個數字的最大公因數。

2.14.5.1.3. Ex3

##. Question+Code

Question **Code**

讓使用者輸入一個正整數n，
求出1! + 2! + 3! + … + n!之值並輸出。

2.14.5.1.4. Ex4

1. Question+Code

Question **Code**

請撰寫程式輸出500以內的完全數。
其中，完全數代表一正整數，除其自身以外之所有因數的和恰好為該數。
例如，6為第一個完全數，6除自身以外的因數有1、2、3，則6 = 1 + 2 + 3。

2.14.5.1.5. Ex5

1. Question+Code

Question **Code**

請撰寫程式讓使用者輸入一正整數n，然後輸出數列的前n項。
例如，輸入5，輸出`0 1 1 2 3` 。
數列為`0 1 1 2 3 5 8 13 21 34 55 ...`。

2.14.5.1.6. Ex6

1. Question+Code

Question :selected: **Code**

《孫子算經》裡有個「物不知其數」的問題：
「今有物，不知其數，三三數之賸二，五五數之賸三，七七數之賸二。
問物幾何？
(眼前有一堆物品，不知有多少個。
每次取3個，最後剩下2個；
每次取5個，最後剩下3個；
每次取7個，最後剩下2個。
問這堆物品到底有多少個？)」。
請利用`for`迴圈求出該問題的最小解。

2.14.5.1.7. Ex7

1. Question+Code

Question **Code 1: String-typed Solution** **Code 2: Arithmetic-typed Solution**

請寫出一個能判定「猜數字」結果的程式碼，預設答案為`1234`。
例如：玩家輸入：`0243`，則輸出`1A2B`。
(A前面的數字表示位置正確的數的個數，B前的數字表示數字正確而位置不對的數的個數。)

2.14.5.1.8. Ex8

1. Question+Code

Question **Code**

> 請撰寫一個程式，讓使用者輸入一正數N，再利用二分逼近法求N的平方根並輸出。

2.14.5.1.9. Ex9

1. Question+Code

> **Question** **Code**
>
> 預設一個List = [9, 8, 7, 6, 5, 4, 3, 2, 1, 0]，
> 利用氣泡排序法將其元素由小到大排列後輸出。
> 氣泡排序法：
> (1) 比較相鄰的兩個元素，若前面的元素較大就進行交換。
> (2) 重複進行(1)的動作直到最後面，最後一個元素將會是最大值。
> (3) 重複進行(1)、(2)的動作，每次比較到上一輪的前一個元素。
> (4) 重複進行以上動作直到沒有元素需要比較。

2.14.5.1.10. Ex10

1. Question+Code

> **Question** **Code**
>
> 讓使用者輸入一串數字，再倒序後輸出。例：輸入「123456」；輸出「654321」。

2.14.5.2. Classroom

2.14.5.2.1. Ex1: Star Shape

1. Question

> 讓使用者輸入一個正整數，並使用迴圈，一一畫出以下的星星圖形，共26種圖形。
> 迴圈的形式包括: 1-while, 1-for, 2-while, 2-for, while-for, for-while
> 請讓每一種圖形，使用一支小程式。
> 如果輸入 5，則會顯示以下的圖形。
>
> ```
> *
> *
> *
> ```

```
*
*

*****

*           *   *****   *****
**         **   ****     ****
***       ***   ***       ***
****     ****   **         **
*****   *****   *           *

  *     *****   *         *
 ***     ***    **       **
*****     *     ***     ***
                **       **
                *         *

    *       *********   *           *
   ***       *******    **         **
  *****       *****     ***       ***
 *******       ***      ****     ****
*********       *       *****   *****
                        ****     ****
                        ***       ***
                        **         **
                        *           *

    *       * * * * *   *           *
   * *       * * * *     *         *
  * * *       * * *     * *       * *
 * * * *       * *       * *     * *
* * * * *       *       * * *   * * *
                         * *     * *
                        * *       * *
                         *         *
                        *           *

*       *   *********   *********   *********
**     **   *********    ********   ********
***   ***   *********     *******   *******
**** ****   *********      ******   ******
*********   *********       *****   *****
*********   **** ****      ******   ******
*********   ***   ***     *******   *******
*********   **     **    ********   ********
*********   *       *   *********   *********

    *       *********  *****           *****
   ***      *********  ******         ******
  *****     *********  *******       *******
 *******    *********  ********     ********
*********   *********  *********   *********
*********    *******   ********     ********
*********     *****    *******       *******
```

```
*********       ***      ******          ******
*********        *        *****           *****
```

2. Code: 1-while loop

> CPH 高一, 胡承恩, 鳳山高中, 20201129 高一, 余柏諺, 鳳山高中, 20201129. 高一, 王志弘, 鳳山高中, 20201130.
> 資訊科技二專7班, 王碩宏, 中正預校國中部理化科專任教師, 20210716.
> 資訊科技二專7班, 林琇瑾, 瑞祥國中童軍科專任教師, 20210716.

3. Code: 2-while loop
4. Code: 1-for loop

> CPH 高一, 余柏諺, 鳳山高中, 20201219.

5. Code: 2-for loop
6. Code: while-for loop
7. Code: for-while loop

2.14.5.2.2. Ex2: Number Shape

1. Question

```
讓使用者輸入一個正整數，並使用迴圈，一一畫出以下的數字圖形，
包括升冪與降冪兩類，共52種圖形。
迴圈的形式包括: 1-while, 1-for, 2-while, 2-for, while-for, for-while
請讓每一種圖形，使用一支小程式。
如果輸入 5，則會顯示以下的圖形。

12345    54321

1    5
2    4
3    3
4    2
5    1

1        5            1        5    11111    55555    11111    55555
22       44           22       44   2222     4444     2222     4444
333      333          333      333  333        333      333      333
4444     2222         4444     2222 44           22       22       22
55555    11111        55555    11111 5            1        1        1

  1        5       55555    11111   5        1          5        1
 333      333       333      333    53       13         35       31
55555    11111       1        5     531      135        135      531
                                    53       13         35       31
                                    5        1          5        1
```

```
    1            5         111111111   555555555   1        5            1
5
   222          444         2222222     4444444     12       54           21
45
  33333        33333        33333       33333       123      543          321
345
 4444444     2222222         222         222        1234     5432         4321
2345
555555555   111111111          1           1        12345    54321        54321
12345
                                                    1234     5432         4321
2345
                                                    123      543          321
345
                                                    12       54           21
45
                                                    1        5            1
5

    1            5         1 1 1 1 1   5 5 5 5 5    5        1            5
1
   2 2          4 4         2 2 2 2     4 4 4 4      4        2            4
2
  3 3 3        3 3 3        3 3 3       3 3 3       5 3      1 3          3 5
3 1
 4 4 4 4      2 2 2 2         4 4         2 2        4 2      2 4          2 4
4 2
5 5 5 5 5    1 1 1 1 1          5           1        5 3 1    1 3 5        1 3 5
5 3 1
                                                     4 2      2 4          2 4
4 2
                                                    5 3      1 3          3 5
3 1
                                                     4        2            4
2
                                                    5        1            5
1

1        1   5        5   555555555   111111111   123455555   543211111
555554321    111112345
22      22   44      44   555555555   111111111    23455555    43211111
55555432     11111234
333    333   333    333   555555555   111111111     3455555     3211111
5555543      1111123
4444 4444    2222 2222    555555555   111111111      455555      211111
555554       111112
555555555    111111111    555555555   111111111       55555       11111
55555        11111
555555555    111111111    4444 4444   2222 2222      455555      211111
555554       111112
555555555    111111111    333    333  333    333     3455555     3211111
5555543      1111123
555555555    111111111    22      22   44      44    23455555    43211111
55555432     11111234
```

```
555555555   111111111   1       1   5       5   123455555   543211111
555554321   111112345

    1           5       555555555   111111111   55555       11111
55555       11111
   222         444      555555555   111111111   555554      111112
455555      211111
  33333       33333     555555555   111111111   5555543     1111123
3455555     3211111
 4444444     2222222    555555555   111111111   55555432    11111234
23455555    43211111
555555555   111111111   555555555   111111111   555554321   111112345
123455555   543211111
555555555   111111111    4444444     2222222    55555432    11111234
23455555    43211111
555555555   111111111     33333       33333     5555543     1111123
3455555     3211111
555555555   111111111      222         444      555554      111112
455555      211111
555555555   111111111       1           5       55555       11111
55555       11111
```

2. Code: 1-while loop
3. Code: 2-while loop
4. Code: 1-for loop
5. Code: 2-for loop
6. Code: while-for loop
7. Code: for-while loop

2.14.5.2.3. Ex3: Alpha Shape

1. Question

```
讓使用者輸入一個正整數，並使用迴圈，一一畫出以下的字母圖形
包括升冪與降冪兩類，還有大寫與小寫，共104種圖形。
迴圈的形式包括: 1-while, 1-for, 2-while, 2-for, while-for, for-while
請讓每一種圖形，使用一支小程式。
如果輸入 5，則會顯示以下的圖形。

abcde   edbca   aBcDe   eDcBa

a   e   a   e
b   b   B   D
c   c   c   c
d   d   D   B
e   a   e   a

a       e           a       e   aaaaa   eeeee   aaaaa   eeeee
bb      dd        bb      dd    bbbb    dddd    bbbb    dddd
```

```
ccc     ccc       ccc     ccc   ccc     ccc     ccc     ccc
dddd    bbbb     dddd    bbbb   dd      bb      bb      bb
eeeee   aaaaa   eeeee   aaaaa   e       a       a       a

a       e           a       e   aaaaa   eeeee   aaaaa   eeeee
BB      DD         BB      DD   BBBB    DDDD    BBBB    DDDD
ccc     ccc       ccc     ccc   ccc     ccc     ccc     ccc
DDDD    BBBB     DDDD    BBBB   DD      BB      BB      BB
eeeee   aaaaa   eeeee   aaaaa   e       a       a       a

  a       e     aaaaa   eeeee   a       e           a       e
 ccc     ccc     ccc     ccc    ac      ec         ca      ce
eeeee   aaaaa     e       a     ace     ece       eca     ace
                                ac      ec         ca      ce
                                a       e           a       e

  a       e     aaaaa   eeeee   a        e          a       e
 CCC     CCC     CCC     CCC    aC       eC         Ca      Ce
eeeee   aaaaa     e       a     aCe      eCa       eCa     eCe
                                aC       ec         Ca      Ce
                                a        e          a       e


    a           e        aaaaaaaaa   eeeeeeeee  a      e          a
e
   bbb         ddd        bbbbbbb     ddddddd   ab     ed        ba
de
  ccccc       ccccc       ccccc       ccccc    abc    edc      cba
cde
 ddddddd     bbbbbbb        bbb         bbb     abcd   edcb    dcba
bcde
eeeeeeeee   aaaaaaaaa        a           a      abcde  edcba  edcba
abcde
                                                abcd   edcb    dcba
bcde
                                                edc    cba      cde
cde
                                                ab     ed        ba
de
                                                a      e          a
e

    a           e        aaaaaaaaa   eeeeeeeee  a      e          a
e
   BBB         DDD        BBBBBBB     DDDDDDD   aB     eD        Ba
De
  ccccc       ccccc       ccccc       ccccc    aBc    eDc      cBa
cDe
 DDDDDDD     BBBBBBB        BBB         BBB     aBcD   eDcB    DcBa
BcDe
eeeeeeeee   aaaaaaaaa        a           a      aBcDe  eDcBa  eDcBa
aBcDe
                                                aBcD   eDcB    DcBa
BcDe
                                                eDc    eDc      cDe
```

```
cDe
                                                aB     eD        Ba
De
                                                a      e         a
e

    a          e        a a a a a   e e e e e  e      a         e
a
   b b        d d        b b b b    d d d d     d      b        d
b
  c c c      c c c        c c c      c c c     e c    a c      c e
c a
 d d d d    b b b b        d d        b b       d b    b d    b d     d
b
e e e e e   a a a a a        e          a       e c a  a c e  a c e   e
c a
                                                d b    b d    b d     d
b
                                                e c    a c      c e
c a
                                                 d      b        d
b
                                                e      a         e
a

    a          e        a a a a a  e e e e e   e      a         e
a
   B B        D D        B B B B    D D D D     D      B        D
B
  c c c      c c c        c c c      c c c     e c    a c      c e
c a
 D D D D    B B B B        D D        B B       D B    B D    B D     D
B
e e e e e   a a a a a        e          a       e c a  a c e  a c e   e
c a
                                                D B    B D    B D     D
B
                                                e c    a c      c e
c a
                                                 D      B        D
B
                                                e      a         e
a

a       a   e       e   eeeeeeeee   aaaaaaaaa   abcdeeeee   edcbaaaaa
eeeeedcba   aaaaabcde
bb     bb   dd     dd   eeeeeeeee   aaaaaaaaa    bcdeeeee    dcbaaaaa
eeeeedcb    aaaaabcd
ccc   ccc   ccc   ccc   eeeeeeeee   aaaaaaaaa     cdeeeee     cbaaaaa
eeeeedc     aaaaabc
dddd dddd   bbbb bbbb   eeeeeeeee   aaaaaaaaa      deeeee      baaaaa
eeeeed      aaaaab
eeeeeeeee   aaaaaaaaa   eeeeeeeee   aaaaaaaaa       eeeee       aaaaa
eeeee       aaaaa
eeeeeeeee   aaaaaaaaa   dddd dddd   bbbb bbbb      deeeee      baaaaa
```

```
eeeeed      aaaaab
eeeeeeeee   aaaaaaaaa   ccc   ccc   ccc   ccc     cdeeeee     cbaaaaa
eeeeedc     aaaaabc
eeeeeeeee   aaaaaaaaa   bb     bb   dd     dd    bcdeeeee    dcbaaaaa
eeeeedcb    aaaaabcd
eeeeeeeee   aaaaaaaaa   a       a   e       e   abcdeeeee   edcbaaaaa
eeeeedcba   aaaaabcde

a       a   e       e   eeeeeeeee   aaaaaaaaa   aBcDeeeee   eDcBaaaaa
eeeeeDcBa   aaaaaBcDe
BB     BB   DD     DD   eeeeeeeee   aaaaaaaaa    BcDeeeee    DcBaaaaa
eeeeeDcB    aaaaaBcD
ccc   ccc   ccc   ccc   eeeeeeeee   aaaaaaaaa     cDeeeee     cBaaaaa
eeeeeDc     aaaaaBc
DDDD DDDD   BBBB BBBB   eeeeeeeee   aaaaaaaaa      Deeeee      Baaaaa
eeeeeD      aaaaaB
eeeeeeeee   aaaaaaaaa   eeeeeeeee   aaaaaaaaa       eeeee       aaaaa
eeeee       aaaaa
eeeeeeeee   aaaaaaaaa   DDDD DDDD   BBBB BBBB      Deeeee      Baaaaa
eeeeeD      aaaaaB
eeeeeeeee   aaaaaaaaa   ccc   ccc   ccc   ccc     cDeeeee     cBaaaaa
eeeeeDc     aaaaaBc
eeeeeeeee   aaaaaaaaa   BB     BB   DD     DD    BcDeeeee    DcBaaaaa
eeeeeDcB    aaaaaBcD
eeeeeeeee   aaaaaaaaa   a       a   e       e   aBcDeeeee   eDcBaaaaa
eeeeeDcBa   aaaaaBcDe

    a           e       eeeeeeeee   aaaaaaaaa   eeeee       aaaaa
eeeee       aaaaa
   bbb         ddd      eeeeeeeee   aaaaaaaaa   eeeeed      aaaaab
deeeee      baaaaa
  ccccc       ccccc     eeeeeeeee   aaaaaaaaa   eeeeedc     aaaaabc
cdeeeee     cbaaaaa
 ddddddd     bbbbbbb    eeeeeeeee   aaaaaaaaa   eeeeedcb    aaaaabcd
bcdeeeee    dcbaaaaa
eeeeeeeee   aaaaaaaaa   eeeeeeeee   aaaaaaaaa   eeeeedcba   aaaaabcde
abcdeeeee   edcbaaaaa
eeeeeeeee   aaaaaaaaa    ddddddd     bbbbbbb    eeeeedcb    aaaaabcd
bcdeeeee    dcbaaaaa
eeeeeeeee   aaaaaaaaa     ccccc       ccccc     eeeeedc     aaaaabc
cdeeeee     cbaaaaa
eeeeeeeee   aaaaaaaaa      bbb         ddd      eeeeed      aaaaab
deeeee      baaaaa
eeeeeeeee   aaaaaaaaa       a           e       eeeee       aaaaa
eeeee       aaaaa

    a           e       eeeeeeeee   aaaaaaaaa   eeeee       aaaaa
eeeee       aaaaa
   BBB         DDD      eeeeeeeee   aaaaaaaaa   eeeeeD      aaaaaB
Deeeee      Baaaaa
  ccccc       ccccc     eeeeeeeee   aaaaaaaaa   eeeeeDc     aaaaaBc
cDeeeee     cBaaaaa
 DDDDDDD     BBBBBBB    eeeeeeeee   aaaaaaaaa   eeeeeDcB    aaaaaBcD
BcDeeeee    DcBaaaaa
eeeeeeeee   aaaaaaaaa   eeeeeeeee   aaaaaaaaa   eeeeeDcBa   aaaaaBcDe
```

```
aBcDeeeee   eDcBaaaaa
eeeeeeeee   aaaaaaaaa    DDDDDDD     BBBBBBB     eeeeeDcB    aaaaaBcD
BcDeeeee    DcBaaaaa
eeeeeeeee   aaaaaaaaa     ccccc       ccccc      eeeeeDc     aaaaaBc
cDeeeee     cBaaaaa
eeeeeeeee   aaaaaaaaa      BBB         DDD       eeeeeD      aaaaaB
Deeeee      Baaaaa
eeeeeeeee   aaaaaaaaa       a           e        eeeee       aaaaa
eeeee       aaaaa
```

2. Code: 1-while loop
3. Code: 2-while loop
4. Code: 1-for loop
5. Code: 2-for loop
6. Code: while-for loop
7. Code: for-while loop

2.14.5.2.4. Ex4a: 9x9

1. Generic table
2. Code+Output

Code **Output**

```
第1種寫法，稍微瑣碎，但較清楚，易了解
1x1=1   1x2=2   1x3=3   1x4=4   1x5=5   1x6=6   1x7=7   1x8=8
1x9=9
2x1=2   2x2=4   2x3=6   2x4=8   2x5=10  2x6=12  2x7=14  2x8=16
2x9=18
3x1=3   3x2=6   3x3=9   3x4=12  3x5=15  3x6=18  3x7=21  3x8=24
3x9=27
4x1=4   4x2=8   4x3=12  4x4=16  4x5=20  4x6=24  4x7=28  4x8=32
4x9=36
5x1=5   5x2=10  5x3=15  5x4=20  5x5=25  5x6=30  5x7=35  5x8=40
5x9=45
6x1=6   6x2=12  6x3=18  6x4=24  6x5=30  6x6=36  6x7=42  6x8=48
6x9=54
7x1=7   7x2=14  7x3=21  7x4=28  7x5=35  7x6=42  7x7=49  7x8=56
7x9=63
8x1=8   8x2=16  8x3=24  8x4=32  8x5=40  8x6=48  8x7=56  8x8=64
8x9=72
9x1=9   9x2=18  9x3=27  9x4=36  9x5=45  9x6=54  9x7=63  9x8=72
9x9=81
------------------------------------------------
第2種寫法，較精簡，但稍微難理解
第1種組合：while-while loop
1x1= 1  1x2= 2  1x3= 3  1x4= 4  1x5= 5  1x6= 6  1x7= 7  1x8= 8
1x9= 9
```

```
2x1= 2  2x2= 4  2x3= 6  2x4= 8  2x5=10  2x6=12  2x7=14  2x8=16
2x9=18
3x1= 3  3x2= 6  3x3= 9  3x4=12  3x5=15  3x6=18  3x7=21  3x8=24
3x9=27
4x1= 4  4x2= 8  4x3=12  4x4=16  4x5=20  4x6=24  4x7=28  4x8=32
4x9=36
5x1= 5  5x2=10  5x3=15  5x4=20  5x5=25  5x6=30  5x7=35  5x8=40
5x9=45
6x1= 6  6x2=12  6x3=18  6x4=24  6x5=30  6x6=36  6x7=42  6x8=48
6x9=54
7x1= 7  7x2=14  7x3=21  7x4=28  7x5=35  7x6=42  7x7=49  7x8=56
7x9=63
8x1= 8  8x2=16  8x3=24  8x4=32  8x5=40  8x6=48  8x7=56  8x8=64
8x9=72
9x1= 9  9x2=18  9x3=27  9x4=36  9x5=45  9x6=54  9x7=63  9x8=72
9x9=81
------------------------------------------------
第2種寫法，較精簡，但稍微難理解
第2種組合：for-while loop
1x1= 1  1x2= 2  1x3= 3  1x4= 4  1x5= 5  1x6= 6  1x7= 7  1x8= 8
1x9= 9
2x1= 2  2x2= 4  2x3= 6  2x4= 8  2x5=10  2x6=12  2x7=14  2x8=16
2x9=18
3x1= 3  3x2= 6  3x3= 9  3x4=12  3x5=15  3x6=18  3x7=21  3x8=24
3x9=27
4x1= 4  4x2= 8  4x3=12  4x4=16  4x5=20  4x6=24  4x7=28  4x8=32
4x9=36
5x1= 5  5x2=10  5x3=15  5x4=20  5x5=25  5x6=30  5x7=35  5x8=40
5x9=45
6x1= 6  6x2=12  6x3=18  6x4=24  6x5=30  6x6=36  6x7=42  6x8=48
6x9=54
7x1= 7  7x2=14  7x3=21  7x4=28  7x5=35  7x6=42  7x7=49  7x8=56
7x9=63
8x1= 8  8x2=16  8x3=24  8x4=32  8x5=40  8x6=48  8x7=56  8x8=64
8x9=72
9x1= 9  9x2=18  9x3=27  9x4=36  9x5=45  9x6=54  9x7=63  9x8=72
9x9=81
------------------------------------------------
第2種寫法，較精簡，但稍微難理解
第3種組合：for-for loop
1x1= 1  1x2= 2  1x3= 3  1x4= 4  1x5= 5  1x6= 6  1x7= 7  1x8= 8
1x9= 9
2x1= 2  2x2= 4  2x3= 6  2x4= 8  2x5=10  2x6=12  2x7=14  2x8=16
2x9=18
3x1= 3  3x2= 6  3x3= 9  3x4=12  3x5=15  3x6=18  3x7=21  3x8=24
3x9=27
4x1= 4  4x2= 8  4x3=12  4x4=16  4x5=20  4x6=24  4x7=28  4x8=32
4x9=36
5x1= 5  5x2=10  5x3=15  5x4=20  5x5=25  5x6=30  5x7=35  5x8=40
5x9=45
6x1= 6  6x2=12  6x3=18  6x4=24  6x5=30  6x6=36  6x7=42  6x8=48
6x9=54
7x1= 7  7x2=14  7x3=21  7x4=28  7x5=35  7x6=42  7x7=49  7x8=56
7x9=63
8x1= 8  8x2=16  8x3=24  8x4=32  8x5=40  8x6=48  8x7=56  8x8=64
```

```
8x9=72
9x1= 9  9x2=18  9x3=27  9x4=36  9x5=45  9x6=54  9x7=63  9x8=72
9x9=81
-------------------------------------------
第2種寫法，較精簡，但稍微難理解
第4種組合：while-for loop
1x1= 1  1x2= 2  1x3= 3  1x4= 4  1x5= 5  1x6= 6  1x7= 7  1x8= 8
1x9= 9
2x1= 2  2x2= 4  2x3= 6  2x4= 8  2x5=10  2x6=12  2x7=14  2x8=16
2x9=18
3x1= 3  3x2= 6  3x3= 9  3x4=12  3x5=15  3x6=18  3x7=21  3x8=24
3x9=27
4x1= 4  4x2= 8  4x3=12  4x4=16  4x5=20  4x6=24  4x7=28  4x8=32
4x9=36
5x1= 5  5x2=10  5x3=15  5x4=20  5x5=25  5x6=30  5x7=35  5x8=40
5x9=45
6x1= 6  6x2=12  6x3=18  6x4=24  6x5=30  6x6=36  6x7=42  6x8=48
6x9=54
7x1= 7  7x2=14  7x3=21  7x4=28  7x5=35  7x6=42  7x7=49  7x8=56
7x9=63
8x1= 8  8x2=16  8x3=24  8x4=32  8x5=40  8x6=48  8x7=56  8x8=64
8x9=72
9x1= 9  9x2=18  9x3=27  9x4=36  9x5=45  9x6=54  9x7=63  9x8=72
9x9=81
```

2.14.5.2.5. Ex4b: 9x9: Fixed Hole Line

1. Question

    a. with a fixed hole line

    b. 9x9 multiplication table with a fixed hole line, such as 5.

2. Code+Output

Code Output

```
1x1= 1  1x2= 2  1x3= 3  1x4= 4  1x5= 5  1x6= 6  1x7= 7  1x8= 8
1x9= 9
2x1= 2  2x2= 4  2x3= 6  2x4= 8  2x5=10  2x6=12  2x7=14  2x8=16
2x9=18
3x1= 3  3x2= 6  3x3= 9  3x4=12  3x5=15  3x6=18  3x7=21  3x8=24
3x9=27
4x1= 4  4x2= 8                                          4x8=32
4x9=36
5x1= 5  5x2=10                                          5x8=40
5x9=45
6x1= 6  6x2=12                                          6x8=48
6x9=54
7x1= 7  7x2=14  7x3=21  7x4=28  7x5=35  7x6=42  7x7=49  7x8=56
```

```
7x9=63
8x1= 8  8x2=16  8x3=24  8x4=32  8x5=40  8x6=48  8x7=56  8x8=64
8x9=72
9x1= 9  9x2=18  9x3=27  9x4=36  9x5=45  9x6=54  9x7=63  9x8=72
9x9=81
```

2.14.5.2.6. Ex4c: 9x9: Rotated Hole Line

1. Question

    a. with a rotated hole line

    b. 9x9 multiplication table with a fixed hole line, such as 5.

    c. The hole line can be rotated by clock-wise.

2. Code+Output

Code | **Code: TA, 張晉, 20180724** | **Output**

```
1x1= 1  1x2= 2  1x3= 3  1x4= 4  1x5= 5  1x6= 6  1x7= 7  1x8= 8
1x9= 9
2x1= 2  2x2= 4  2x3= 6  2x4= 8  2x5=10  2x6=12  2x7=14  2x8=16
2x9=18
3x1= 3  3x2= 6  3x3= 9  3x4=12  3x5=15  3x6=18  3x7=21  3x8=24
3x9=27
4x1= 4  4x2= 8  4x3=12  4x4=16  4x5=20  4x6=24  4x7=28  4x8=32
4x9=36
5x1= 5  5x2=10                                          5x8=40
5x9=45
6x1= 6  6x2=12  6x3=18  6x4=24  6x5=30  6x6=36  6x7=42  6x8=48
6x9=54
7x1= 7  7x2=14  7x3=21  7x4=28  7x5=35  7x6=42  7x7=49  7x8=56
7x9=63
8x1= 8  8x2=16  8x3=24  8x4=32  8x5=40  8x6=48  8x7=56  8x8=64
8x9=72
9x1= 9  9x2=18  9x3=27  9x4=36  9x5=45  9x6=54  9x7=63  9x8=72
9x9=81

1x1= 1  1x2= 2  1x3= 3  1x4= 4  1x5= 5  1x6= 6  1x7= 7  1x8= 8
1x9= 9
2x1= 2  2x2= 4  2x3= 6  2x4= 8  2x5=10  2x6=12  2x7=14  2x8=16
2x9=18
3x1= 3  3x2= 6          3x4=12  3x5=15  3x6=18  3x7=21  3x8=24
3x9=27
4x1= 4  4x2= 8  4x3=12          4x5=20  4x6=24  4x7=28  4x8=32
4x9=36
5x1= 5  5x2=10  5x3=15  5x4=20          5x6=30  5x7=35  5x8=40
5x9=45
6x1= 6  6x2=12  6x3=18  6x4=24  6x5=30          6x7=42  6x8=48
```

```
6x9=54
7x1= 7  7x2=14  7x3=21  7x4=28  7x5=35  7x6=42          7x8=56
7x9=63
8x1= 8  8x2=16  8x3=24  8x4=32  8x5=40  8x6=48  8x7=56  8x8=64
8x9=72
9x1= 9  9x2=18  9x3=27  9x4=36  9x5=45  9x6=54  9x7=63  9x8=72
9x9=81

1x1= 1  1x2= 2  1x3= 3  1x4= 4  1x5= 5  1x6= 6  1x7= 7  1x8= 8
1x9= 9
2x1= 2  2x2= 4  2x3= 6  2x4= 8  2x5=10  2x6=12  2x7=14  2x8=16
2x9=18
3x1= 3  3x2= 6  3x3= 9  3x4=12          3x6=18  3x7=21  3x8=24
3x9=27
4x1= 4  4x2= 8  4x3=12  4x4=16          4x6=24  4x7=28  4x8=32
4x9=36
5x1= 5  5x2=10  5x3=15  5x4=20          5x6=30  5x7=35  5x8=40
5x9=45
6x1= 6  6x2=12  6x3=18  6x4=24          6x6=36  6x7=42  6x8=48
6x9=54
7x1= 7  7x2=14  7x3=21  7x4=28          7x6=42  7x7=49  7x8=56
7x9=63
8x1= 8  8x2=16  8x3=24  8x4=32  8x5=40  8x6=48  8x7=56  8x8=64
8x9=72
9x1= 9  9x2=18  9x3=27  9x4=36  9x5=45  9x6=54  9x7=63  9x8=72
9x9=81

1x1= 1  1x2= 2  1x3= 3  1x4= 4  1x5= 5  1x6= 6  1x7= 7  1x8= 8
1x9= 9
2x1= 2  2x2= 4  2x3= 6  2x4= 8  2x5=10  2x6=12  2x7=14  2x8=16
2x9=18
3x1= 3  3x2= 6  3x3= 9  3x4=12  3x5=15  3x6=18          3x8=24
3x9=27
4x1= 4  4x2= 8  4x3=12  4x4=16  4x5=20          4x7=28  4x8=32
4x9=36
5x1= 5  5x2=10  5x3=15  5x4=20          5x6=30  5x7=35  5x8=40
5x9=45
6x1= 6  6x2=12  6x3=18          6x5=30  6x6=36  6x7=42  6x8=48
6x9=54
7x1= 7  7x2=14          7x4=28  7x5=35  7x6=42  7x7=49  7x8=56
7x9=63
8x1= 8  8x2=16  8x3=24  8x4=32  8x5=40  8x6=48  8x7=56  8x8=64
8x9=72
9x1= 9  9x2=18  9x3=27  9x4=36  9x5=45  9x6=54  9x7=63  9x8=72
9x9=81
```

2.14.5.2.7. Ex4d: 9x9: Fct Rotated Line

1. Question

    a. with a Hole Line

b. 9x9 multiplication table with a fixed hole line.

c. The fixed hole line can be rotated by clock-wise.

2. Code+Output

Code | Code: 二專班, 黃文昌, 20180602 | Output

```
1x1= 1  1x2= 2  1x3= 3  1x4= 4  1x5= 5  1x6= 6  1x7= 7  1x8= 8
1x9= 9
2x1= 2  2x2= 4  2x3= 6  2x4= 8  2x5=10  2x6=12  2x7=14  2x8=16
2x9=18
3x1= 3  3x2= 6  3x3= 9  3x4=12  3x5=15  3x6=18  3x7=21  3x8=24
3x9=27
4x1= 4  4x2= 8  4x3=12  4x4=16  4x5=20  4x6=24  4x7=28  4x8=32
4x9=36
5x1= 5  5x2=10                                          5x8=40
5x9=45
6x1= 6  6x2=12  6x3=18  6x4=24  6x5=30  6x6=36  6x7=42  6x8=48
6x9=54
7x1= 7  7x2=14  7x3=21  7x4=28  7x5=35  7x6=42  7x7=49  7x8=56
7x9=63
8x1= 8  8x2=16  8x3=24  8x4=32  8x5=40  8x6=48  8x7=56  8x8=64
8x9=72
9x1= 9  9x2=18  9x3=27  9x4=36  9x5=45  9x6=54  9x7=63  9x8=72
9x9=81

1x1= 1  1x2= 2  1x3= 3  1x4= 4  1x5= 5  1x6= 6  1x7= 7  1x8= 8
1x9= 9
2x1= 2  2x2= 4  2x3= 6  2x4= 8  2x5=10  2x6=12  2x7=14  2x8=16
2x9=18
3x1= 3  3x2= 6          3x4=12  3x5=15  3x6=18  3x7=21  3x8=24
3x9=27
4x1= 4  4x2= 8  4x3=12          4x5=20  4x6=24  4x7=28  4x8=32
4x9=36
5x1= 5  5x2=10  5x3=15  5x4=20          5x6=30  5x7=35  5x8=40
5x9=45
6x1= 6  6x2=12  6x3=18  6x4=24  6x5=30          6x7=42  6x8=48
6x9=54
7x1= 7  7x2=14  7x3=21  7x4=28  7x5=35  7x6=42          7x8=56
7x9=63
8x1= 8  8x2=16  8x3=24  8x4=32  8x5=40  8x6=48  8x7=56  8x8=64
8x9=72
9x1= 9  9x2=18  9x3=27  9x4=36  9x5=45  9x6=54  9x7=63  9x8=72
9x9=81
1x1= 1  1x2= 2  1x3= 3  1x4= 4  1x5= 5  1x6= 6  1x7= 7  1x8= 8
1x9= 9
2x1= 2  2x2= 4  2x3= 6  2x4= 8  2x5=10  2x6=12  2x7=14  2x8=16
2x9=18
3x1= 3  3x2= 6  3x3= 9  3x4=12          3x6=18  3x7=21  3x8=24
3x9=27
4x1= 4  4x2= 8  4x3=12  4x4=16          4x6=24  4x7=28  4x8=32
4x9=36
5x1= 5  5x2=10  5x3=15  5x4=20          5x6=30  5x7=35  5x8=40
```

```
5x9=45
6x1= 6  6x2=12  6x3=18  6x4=24          6x6=36  6x7=42  6x8=48
6x9=54
7x1= 7  7x2=14  7x3=21  7x4=28          7x6=42  7x7=49  7x8=56
7x9=63
8x1= 8  8x2=16  8x3=24  8x4=32  8x5=40  8x6=48  8x7=56  8x8=64
8x9=72
9x1= 9  9x2=18  9x3=27  9x4=36  9x5=45  9x6=54  9x7=63  9x8=72
9x9=81

1x1= 1  1x2= 2  1x3= 3  1x4= 4  1x5= 5  1x6= 6  1x7= 7  1x8= 8
1x9= 9
2x1= 2  2x2= 4  2x3= 6  2x4= 8  2x5=10  2x6=12  2x7=14  2x8=16
2x9=18
3x1= 3  3x2= 6  3x3= 9  3x4=12  3x5=15  3x6=18          3x8=24
3x9=27
4x1= 4  4x2= 8  4x3=12  4x4=16  4x5=20          4x7=28  4x8=32
4x9=36
5x1= 5  5x2=10  5x3=15  5x4=20          5x6=30  5x7=35  5x8=40
5x9=45
6x1= 6  6x2=12  6x3=18          6x5=30  6x6=36  6x7=42  6x8=48
6x9=54
7x1= 7  7x2=14          7x4=28  7x5=35  7x6=42  7x7=49  7x8=56
7x9=63
8x1= 8  8x2=16  8x3=24  8x4=32  8x5=40  8x6=48  8x7=56  8x8=64
8x9=72
9x1= 9  9x2=18  9x3=27  9x4=36  9x5=45  9x6=54  9x7=63  9x8=72
9x9=81
```

2.14.5.2.8. Ex4e: 9x9: Fct Var Rotated Line

1. Question

    a. with a Variable Hole Line

    b. 9x9 multiplication table with a variable hole line, e.g., 1x2, 2x3, etc.

    c. The variable hole line can be rotated by clock-wise.

2. Code+Output

Code | Output

```
1x1= 1  1x2= 2  1x3= 3  1x4= 4  1x5= 5  1x6= 6  1x7= 7  1x8= 8
1x9= 9
2x1= 2  2x2= 4  2x3= 6  2x4= 8  2x5=10  2x6=12  2x7=14  2x8=16
2x9=18
3x1= 3  3x2= 6  3x3= 9  3x4=12  3x5=15  3x6=18  3x7=21  3x8=24
3x9=27
4x1= 4  4x2= 8  4x3=12  4x4=16  4x5=20  4x6=24  4x7=28  4x8=32
```

```
4x9=36
5x1= 5  5x2=10  5x3=15  5x4=20  5x5=25  5x6=30  5x7=35  5x8=40
5x9=45
6x1= 6  6x2=12  6x3=18  6x4=24  6x5=30  6x6=36  6x7=42  6x8=48
6x9=54
7x1= 7  7x2=14  7x3=21  7x4=28  7x5=35  7x6=42  7x7=49  7x8=56
7x9=63
8x1= 8  8x2=16  8x3=24  8x4=32  8x5=40  8x6=48  8x7=56  8x8=64
8x9=72
9x1= 9  9x2=18  9x3=27  9x4=36  9x5=45  9x6=54  9x7=63  9x8=72
9x9=81

1x1= 1  1x2= 2  1x3= 3  1x4= 4  1x5= 5  1x6= 6  1x7= 7  1x8= 8
1x9= 9
2x1= 2  2x2= 4  2x3= 6  2x4= 8  2x5=10  2x6=12  2x7=14  2x8=16
2x9=18
3x1= 3  3x2= 6  3x3= 9  3x4=12  3x5=15  3x6=18  3x7=21  3x8=24
3x9=27
4x1= 4  4x2= 8  4x3=12  4x4=16  4x5=20  4x6=24  4x7=28  4x8=32
4x9=36
5x1= 5
5x9=45
6x1= 6  6x2=12  6x3=18  6x4=24  6x5=30  6x6=36  6x7=42  6x8=48
6x9=54
7x1= 7  7x2=14  7x3=21  7x4=28  7x5=35  7x6=42  7x7=49  7x8=56
7x9=63
8x1= 8  8x2=16  8x3=24  8x4=32  8x5=40  8x6=48  8x7=56  8x8=64
8x9=72
9x1= 9  9x2=18  9x3=27  9x4=36  9x5=45  9x6=54  9x7=63  9x8=72
9x9=81

1x1= 1  1x2= 2  1x3= 3  1x4= 4  1x5= 5  1x6= 6  1x7= 7  1x8= 8
1x9= 9
2x1= 2          2x3= 6  2x4= 8  2x5=10  2x6=12  2x7=14  2x8=16
2x9=18
3x1= 3  3x2= 6          3x4=12  3x5=15  3x6=18  3x7=21  3x8=24
3x9=27
4x1= 4  4x2= 8  4x3=12          4x5=20  4x6=24  4x7=28  4x8=32
4x9=36
5x1= 5  5x2=10  5x3=15  5x4=20          5x6=30  5x7=35  5x8=40
5x9=45
6x1= 6  6x2=12  6x3=18  6x4=24  6x5=30          6x7=42  6x8=48
6x9=54
7x1= 7  7x2=14  7x3=21  7x4=28  7x5=35  7x6=42          7x8=56
7x9=63
8x1= 8  8x2=16  8x3=24  8x4=32  8x5=40  8x6=48  8x7=56
8x9=72
9x1= 9  9x2=18  9x3=27  9x4=36  9x5=45  9x6=54  9x7=63  9x8=72
9x9=81

1x1= 1  1x2= 2  1x3= 3  1x4= 4  1x5= 5  1x6= 6  1x7= 7  1x8= 8
1x9= 9
2x1= 2  2x2= 4  2x3= 6  2x4= 8          2x6=12  2x7=14  2x8=16
2x9=18
3x1= 3  3x2= 6  3x3= 9  3x4=12          3x6=18  3x7=21  3x8=24
```

```
3x9=27
4x1= 4  4x2= 8  4x3=12  4x4=16          4x6=24  4x7=28  4x8=32
4x9=36
5x1= 5  5x2=10  5x3=15  5x4=20          5x6=30  5x7=35  5x8=40
5x9=45
6x1= 6  6x2=12  6x3=18  6x4=24          6x6=36  6x7=42  6x8=48
6x9=54
7x1= 7  7x2=14  7x3=21  7x4=28          7x6=42  7x7=49  7x8=56
7x9=63
8x1= 8  8x2=16  8x3=24  8x4=32          8x6=48  8x7=56  8x8=64
8x9=72
9x1= 9  9x2=18  9x3=27  9x4=36  9x5=45  9x6=54  9x7=63  9x8=72
9x9=81

1x1= 1  1x2= 2  1x3= 3  1x4= 4  1x5= 5  1x6= 6  1x7= 7  1x8= 8
1x9= 9
2x1= 2  2x2= 4  2x3= 6  2x4= 8  2x5=10  2x6=12  2x7=14
2x9=18
3x1= 3  3x2= 6  3x3= 9  3x4=12  3x5=15  3x6=18          3x8=24
3x9=27
4x1= 4  4x2= 8  4x3=12  4x4=16  4x5=20          4x7=28  4x8=32
4x9=36
5x1= 5  5x2=10  5x3=15  5x4=20          5x6=30  5x7=35  5x8=40
5x9=45
6x1= 6  6x2=12  6x3=18          6x5=30  6x6=36  6x7=42  6x8=48
6x9=54
7x1= 7  7x2=14          7x4=28  7x5=35  7x6=42  7x7=49  7x8=56
7x9=63
8x1= 8          8x3=24  8x4=32  8x5=40  8x6=48  8x7=56  8x8=64
8x9=72
9x1= 9  9x2=18  9x3=27  9x4=36  9x5=45  9x6=54  9x7=63  9x8=72
9x9=81
```

2.14.5.2.9. Ex4f: 9x9: Fct Var Rotated Box

1. Question

    a. with a Variable Hole Box

    b. 9x9 multiplication table with a variable hole box, e.g., 1x2, 2x3, etc.

    c. The variable hole box can be rotated by clock-wise.

2. Code+Output

Code Output

```
乘法表大小(2~20, 預設為9)：9
鏤空矩形的長度(2~18, 預設為7)：7
鏤空矩形的寬度(1~5, 預設為1)：2
```

```
 1x 1=  1   1x 2=  2   1x 3=  3   1x 4=  4   1x 5=  5   1x 6=  6
1x 7=  7   1x 8=  8   1x 9=  9
 2x 1=  2   2x 2=  4   2x 3=  6   2x 4=  8   2x 5= 10   2x 6= 12
2x 7= 14   2x 8= 16   2x 9= 18
 3x 1=  3   3x 2=  6   3x 3=  9   3x 4= 12   3x 5= 15   3x 6= 18
3x 7= 21   3x 8= 24   3x 9= 27
 4x 1=  4   4x 2=  8   4x 3= 12   4x 4= 16   4x 5= 20   4x 6= 24
4x 7= 28   4x 8= 32   4x 9= 36
 5x 1=  5   5x 2= 10   5x 3= 15   5x 4= 20   5x 5= 25   5x 6= 30
5x 7= 35   5x 8= 40   5x 9= 45
 6x 1=  6   6x 2= 12   6x 3= 18   6x 4= 24   6x 5= 30   6x 6= 36
6x 7= 42   6x 8= 48   6x 9= 54
 7x 1=  7   7x 2= 14   7x 3= 21   7x 4= 28   7x 5= 35   7x 6= 42
7x 7= 49   7x 8= 56   7x 9= 63
 8x 1=  8   8x 2= 16   8x 3= 24   8x 4= 32   8x 5= 40   8x 6= 48
8x 7= 56   8x 8= 64   8x 9= 72
 9x 1=  9   9x 2= 18   9x 3= 27   9x 4= 36   9x 5= 45   9x 6= 54
9x 7= 63   9x 8= 72   9x 9= 81

 1x 1=  1   1x 2=  2   1x 3=  3   1x 4=  4   1x 5=  5   1x 6=  6
1x 7=  7   1x 8=  8   1x 9=  9
 2x 1=  2   2x 2=  4   2x 3=  6   2x 4=  8   2x 5= 10   2x 6= 12
2x 7= 14   2x 8= 16   2x 9= 18
 3x 1=  3   3x 2=  6   3x 3=  9   3x 4= 12   3x 5= 15   3x 6= 18
3x 7= 21   3x 8= 24   3x 9= 27
 4x 1=  4
4x 9= 36
 5x 1=  5
5x 9= 45
 6x 1=  6
6x 9= 54
 7x 1=  7   7x 2= 14   7x 3= 21   7x 4= 28   7x 5= 35   7x 6= 42
7x 7= 49   7x 8= 56   7x 9= 63
 8x 1=  8   8x 2= 16   8x 3= 24   8x 4= 32   8x 5= 40   8x 6= 48
8x 7= 56   8x 8= 64   8x 9= 72
 9x 1=  9   9x 2= 18   9x 3= 27   9x 4= 36   9x 5= 45   9x 6= 54
9x 7= 63   9x 8= 72   9x 9= 81

 1x 1=  1   1x 2=  2   1x 3=  3   1x 4=  4   1x 5=  5   1x 6=  6
1x 7=  7   1x 8=  8   1x 9=  9
 2x 1=  2                        2x 4=  8   2x 5= 10   2x 6= 12
2x 7= 14   2x 8= 16   2x 9= 18
 3x 1=  3                                   3x 5= 15   3x 6= 18
3x 7= 21   3x 8= 24   3x 9= 27
 4x 1=  4   4x 2=  8                                  4x 6= 24
4x 7= 28   4x 8= 32   4x 9= 36
 5x 1=  5   5x 2= 10   5x 3= 15
5x 7= 35   5x 8= 40   5x 9= 45
 6x 1=  6   6x 2= 12   6x 3= 18   6x 4= 24
6x 8= 48   6x 9= 54
 7x 1=  7   7x 2= 14   7x 3= 21   7x 4= 28   7x 5= 35
7x 9= 63
 8x 1=  8   8x 2= 16   8x 3= 24   8x 4= 32   8x 5= 40   8x 6= 48
8x 9= 72
 9x 1=  9   9x 2= 18   9x 3= 27   9x 4= 36   9x 5= 45   9x 6= 54
```

```
9x 7= 63   9x 8= 72   9x 9= 81

 1x 1=  1   1x 2=  2   1x 3=  3   1x 4=  4   1x 5=  5   1x 6=  6
1x 7=  7   1x 8=  8   1x 9=  9
 2x 1=  2   2x 2=  4   2x 3=  6
2x 7= 14   2x 8= 16   2x 9= 18
 3x 1=  3   3x 2=  6   3x 3=  9
3x 7= 21   3x 8= 24   3x 9= 27
 4x 1=  4   4x 2=  8   4x 3= 12
4x 7= 28   4x 8= 32   4x 9= 36
 5x 1=  5   5x 2= 10   5x 3= 15
5x 7= 35   5x 8= 40   5x 9= 45
 6x 1=  6   6x 2= 12   6x 3= 18
6x 7= 42   6x 8= 48   6x 9= 54
 7x 1=  7   7x 2= 14   7x 3= 21
7x 7= 49   7x 8= 56   7x 9= 63
 8x 1=  8   8x 2= 16   8x 3= 24
8x 7= 56   8x 8= 64   8x 9= 72
 9x 1=  9   9x 2= 18   9x 3= 27   9x 4= 36   9x 5= 45   9x 6= 54
9x 7= 63   9x 8= 72   9x 9= 81

 1x 1=  1   1x 2=  2   1x 3=  3   1x 4=  4   1x 5=  5   1x 6=  6
1x 7=  7   1x 8=  8   1x 9=  9
 2x 1=  2   2x 2=  4   2x 3=  6   2x 4=  8   2x 5= 10   2x 6= 12
2x 9= 18
 3x 1=  3   3x 2=  6   3x 3=  9   3x 4= 12   3x 5= 15
3x 9= 27
 4x 1=  4   4x 2=  8   4x 3= 12   4x 4= 16
4x 8= 32   4x 9= 36
 5x 1=  5   5x 2= 10   5x 3= 15
5x 7= 35   5x 8= 40   5x 9= 45
 6x 1=  6   6x 2= 12                                   6x 6= 36
6x 7= 42   6x 8= 48   6x 9= 54
 7x 1=  7                                 7x 5= 35   7x 6= 42
7x 7= 49   7x 8= 56   7x 9= 63
 8x 1=  8                       8x 4= 32   8x 5= 40   8x 6= 48
8x 7= 56   8x 8= 64   8x 9= 72
 9x 1=  9   9x 2= 18   9x 3= 27   9x 4= 36   9x 5= 45   9x 6= 54
9x 7= 63   9x 8= 72   9x 9= 81

 1x 1=  1   1x 2=  2   1x 3=  3   1x 4=  4   1x 5=  5   1x 6=  6
1x 7=  7   1x 8=  8   1x 9=  9
 2x 1=  2   2x 2=  4   2x 3=  6   2x 4=  8   2x 5= 10   2x 6= 12
2x 7= 14   2x 8= 16   2x 9= 18
 3x 1=  3   3x 2=  6   3x 3=  9   3x 4= 12   3x 5= 15   3x 6= 18
3x 7= 21   3x 8= 24   3x 9= 27
 4x 1=  4   4x 2=  8   4x 3= 12   4x 4= 16   4x 5= 20   4x 6= 24
4x 7= 28   4x 8= 32   4x 9= 36
 5x 1=  5   5x 2= 10   5x 3= 15   5x 4= 20   5x 5= 25   5x 6= 30
5x 7= 35   5x 8= 40   5x 9= 45
 6x 1=  6   6x 2= 12   6x 3= 18   6x 4= 24   6x 5= 30   6x 6= 36
6x 7= 42   6x 8= 48   6x 9= 54
 7x 1=  7   7x 2= 14   7x 3= 21   7x 4= 28   7x 5= 35   7x 6= 42
7x 7= 49   7x 8= 56   7x 9= 63
 8x 1=  8   8x 2= 16   8x 3= 24   8x 4= 32   8x 5= 40   8x 6= 48
```

```
8x 7= 56   8x 8= 64   8x 9= 72
 9x 1=  9   9x 2= 18   9x 3= 27   9x 4= 36   9x 5= 45   9x 6= 54
9x 7= 63   9x 8= 72   9x 9= 81
```

Note

1. Start: 20120311
2. System Environment:

Listing 2.14.5.2.9.2 requirements.txt

```
sphinx==7.1.2                           # Sphinx
graphviz>=0.20.1                        # Graphviz
sphinxbootstrap4theme>=0.6.0            # Theme: Bootstrap
sphinx-material>=0.0.35                 # Theme: Material
sphinxcontrib-plantuml>=0.25            # PlantUML
sphinxcontrib.bibtex>=2.5.0             # Bibliography
sphinx-autorun>=1.1.1                   # ExecCode: pycon
sphinx-execute-code-python3>=0.3        # ExecCode
btd.sphinx.inheritance-diagram>=2.3.1   # Diagram
sphinx-copybutton>=0.5.1                # Copy button
sphinx_code_tabs>=0.5.3                 # Tabs
sphinx-immaterial>=0.11.3               # Tabs

#-------------------------------------------------------
#-- Library Upgrade Error by Library Itself
#   >> It needs to fix by library owner
#   >> After fixed, we need to try it later
#-------------------------------------------------------
pydantic==1.10.10                       # 2.0: sphinx compiler
error, 20230701

#-------------------------------------------------------
#-- Minor Extension
#-------------------------------------------------------
sphinxcontrib.httpdomain>=1.8.1         # HTTP API

#sphinxcontrib-blockdiag>=3.0.0         # Diagram: block
#sphinxcontrib-actdiag>=3.0.0           # Diagram: activity
#sphinxcontrib-nwdiag>=2.0.0            # Diagram: network
#sphinxcontrib-seqdiag>=3.0.0           # Diagram: sequence

#-------------------------------------------------------
#-- Still Wait For Upgrading Version
#-------------------------------------------------------

#-------------------------------------------------------
#-- Still Under Testing
#-------------------------------------------------------
#numpy>=1.24.2                          # Figure: numpy

#-------------------------------------------------------
#-- NOT Workable
#-------------------------------------------------------
#sphinxcontrib.jsdemo==0.1.4    # ExecCode: Need replace
add_js_file()
#jupyter-sphinx==0.4.0          # ExecCode: Need gcc compiler
```

```
#sphinxcontrib.slide==1.0.0     # Slide: Slideshare
#hieroglyph==2.1.0              # Slide: make slides
#matplotlib>=3.7.1              # Plot: Need Python >= v3.8
#manim==0.17.2                  # Diagram: scipy, numpy need
gcc
#sphinx_diagrams==0.4.0         # Diagram: Need GKE access
#sphinx-tabs>=3.4.1                     # Tabs: Conflict w/
sphinx-material
```