計算機概論與程式設計 LAB4

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Lab4 : Array & Function Call

- Matrix Operation
  - Matrix Row Interchange
  - Matrix Colemn Interchange
  - Matrix Transpose
  - Matrix Rotation
- GCD(greatest common divisor)
  - recursive
  - iterative

Question 1. Matrix Row Interchange

- Write a function to Interchange all rows of matrix.
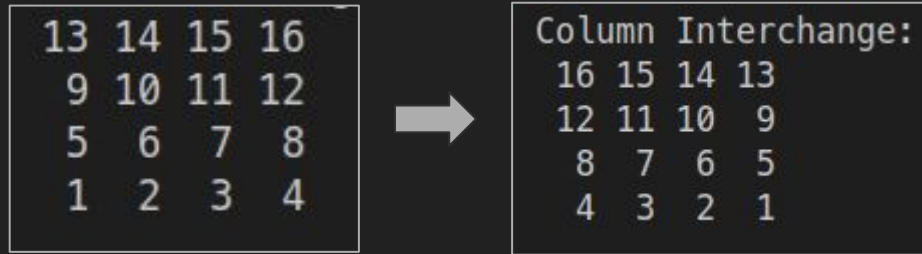- Print out the result of matrix.
- E.g.

Question 1. Matrix Column Interchange

- Write a function to Interchange all columns.
- Print out the result of matrix.
- E.g.

```
13  14  15  16              Column Interchange:
 9  10  11  12                16  15  14  13
 5   6   7   8     →          12  11  10   9
 1   2   3   4                 8   7   6   5
                               4   3   2   1
```

Question 1. Matrix Transpose

- Write a function to transpose the matrix.
- Print out the result of matrix.
- E.g.

16	15	14	13
12	11	10	9
8	7	6	5
4	3	2	1

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Transpose:

16	12	8	4
15	11	7	3
14	10	6	2
13	9	5	1

Question 1. Matrix Rotation

- Write a function to rotate matrix 90 degrees clockwise.
- Print out the result of matrix.
- E.g.

Question 2. GCD(Greatest Common Divisor)

- TA will input two numbers(a, b) randomly
- a, b ranges = [1, 100].
- Print the GCD(最大公因數) of a, b
- Write two functions, one is "Recursive", and one is "Iterative"
- E.g.

```
a = 34
b = 10
Recursive:
The GCD is 2
Iterative:
The GCD is 2
```

```
a = 56
b = 11
Recursive:
The GCD is 1
Iterative:
The GCD is 1
```

Question 2. GCD(Greatest Common Divisor)

- Hint：輾轉相除法
- Modulo Operator (%)

$34 \div 10 = 3...4 \quad \rightarrow \quad 34 = 10 \times 3 + 4$

$10 \div 4 = 2...2 \quad \rightarrow \quad 10 = 4 \times 2 + 2$

$4 \div 2 = 2...0 \quad \rightarrow \quad 4 = 2 \times 2$

Grading

- Matrix Operation
  - Row   20%
  - Colemn   20%
  - Transpose   20%
  - Rotate right 90 degree   20%
- GCD
  - Recursive   10%
  - Iterative   10%
- Total   100%

Requirements

- Write **2** program that can answer 2 questions respectively.
- Upload your code with file name LAB4_1_<StudentID>.c/.cpp, LAB4_2_<StudentID>.c/.cpp to E3.