Midterm Exam

- Date
  - 乙班: 5/10
  - 甲班: 5/11
- Time
  - Group A: 13:10 – 14:00
  - Group B: 14:10 – 15:00
- A one-sided, A4-sized handwritten cheat sheet is allowed

MORE ITERATION, NESTED LOOPS

Nested Loops

- Nested Loops are loops where a loop appears inside the body of another loop
  - The loop inside the body is called the inner loop. The other is called the outer loop
- The inner loop completes all passes for a single pass of the outer loop
  - This is very useful for many types of algorithms, especially with data that has more than one dimension

Repeating a Repetition

```
for i in range(3):
    for j in range(4):
        print(i, j)
```

inner loop

outer loop

Repeating a Repetition

```
for i in range(3):
    for j in range(4):
        print(i, j)
```

```
0 1 2
0 1 2 3
```

```
0 0
0 1
0 2
0 3
1 0
1 1
1 2
1 3
2 0
2 1
2 2
2 3
```

Repeating a Repetition

```
for i in range(3):
    for j in range(4):
        print(i, j)
    print('-----')
```

```
0 1 2
0 1 2 3
```

```
0 0
0 1
0 2
0 3
-----
1 0
1 1
1 2
1 3
-----
2 0
2 1
2 2
2 3
-----
```

Tracing a Nested *for* Loop

```
for i in range(5):
    for j in range(i):
        print(i, j)
```

i	range(i)	j	Value Printed
0	Nothing	None	Nothing
1	0	0	1 0
2	0, 1	0	2 0
		1	2 1
3	0, 1, 2	0	3 0
		1	3 1
		2	3 2
4	0, 1, 2, 3	0	4 0
		1	4 1
		2	4 2
		3	4 3

Tracing a Nested *for* Loop

```
for i in range(4):
    for j in range(i, 3):
        print(i, j)
    print(j)
```

i	range(i, 3)	j	Value Printed
0	0, 1, 2	0	0 0
		1	0 1
		2	0 2
			2
1	1, 2	1	1 1
			1 2
			2
2	2	2	2 2
			2
3	Nothing		2

Fill the Blank

```
for row in range(3):
    for col in range(6):
        print(_______, end=‘ ’)
    print() # go to next line
```

col

```
    0 1 2 3 4 5
row 0 1 2 3 4 5
    0 1 2 3 4 5
```

Fill the Blank

```
for row in range(3):
    for col in range(6):
        print(col, end=‘ ’)
    print() # go to next line
```

col

```
  0 1 2 3 4 5
0 1 2 3 4 5
0 1 2 3 4 5
```

row

Fill the Blank

```
for row in range(3):
    for col in range(6):
        print(_______, end=‘ ’)
    print() # go to next line
```

col

```
  0 0 0 0 0 0
1 1 1 1 1 1
  2 2 2 2 2 2
```

row

Fill the Blank

```
for row in range(3):
    for col in range(6):
        print(row, end=‘ ’)
    print() # go to next line
```

col

row

```
0 0 0 0 0 0
1 1 1 1 1 1
2 2 2 2 2 2
```

What Is Needed in the Blanks?

```
for row in range(5):
    for col in ________:
        print(________, end=‘ ’)
    print() # go to next line
```

```
0 0 0 0 0
1 1 1 1
2 2 2
3 3
4
```

	First Blank	Second Blank
A.	range(row)	row
B.	range(row)	col
C.	range(5 - row)	row
D.	range(5 - row)	col
E.	None of the above	

What Is Needed in the Blanks?

```
for row in range(5):
    for col in ________:
        print(________, end=‘ ’)
    print() # go to next line
```

```
0 0 0 0 0
1 1 1 1
2 2 2
3 3
4
```

First Blank	Second Blank
A. range(row)	row
B. range(row)	col
C. range(5 - row)	**row**
D. range(5 - row)	col
E. None of the above	