

## Homework 2.

陳輝

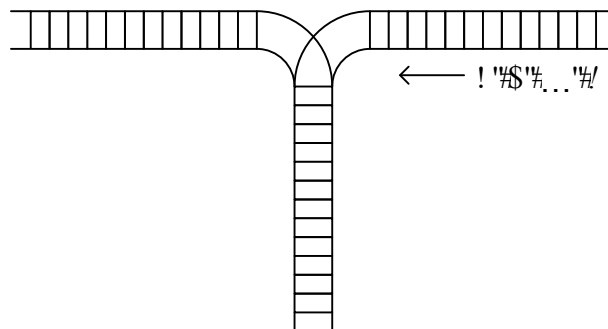
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CSE

- The file name of your homework (in PDF) should be in the format: “學號-作業編號.pdf”. For example: **00357999-ds-hw2.pdf**
- Please submit your homework to Tronclass before **2025/11/02 23:59**.
- **So, we do NOT accept late submission for this homework.**

## Questions:

1. (10%) Consider the railroad switching network. Railroad cars numbered  $0, 1, 2, \dots, n-1$  are at the right. Each car is brought into the stack and removed at any time. For instance, if  $n=3$ , we could move in  $0$ , move in  $1$ , move in  $2$ , and then take the cars out, producing the new order  $2, 1, 0$ . Find all possible permutations for  $n=4$ .



2. (20%) Given a **stack** of size 4, according to Program 3.1 to 3.3 in the textbook, what is the stack in each step when we do the following commands:

**push J1, push J2, push J3, pop, push J4, push J5, push J6**

top	Q[0]	Q[1]	Q[2]	Q[3]	Comments
-1					stack is empty


3. (20%) Given a **queue** of size 4, according to Program 3.5 to 3.6 in the textbook, what is the stack in each step when we do the following commands:

**add J1, add J2, add J3, delete, add J4, add J5, add J6**

front	rear	Q[0]	Q[1]	Q[2]	Q[3]	Comments
-1	-1					queue is empty

4. (20%) Given a **circular queue** of size 4, according to Program 3.7 to 3.8 in the textbook, what is the stack in each step when we do the following commands:

**add J1, add J2, add J3, delete, add J4, add J5, delete, delete**

front	rear	Q[0]	Q[1]	Q[2]	Q[3]	Comments
0	0					queue is empty

5. (20%) Write the postfix form of the following infix expressions:

(a)  $(A + B) * C + D / (E + F * G) - H$

(b)  $(A \&\& B) \parallel C \parallel ! (E > F)$

6. (10%) Write the infix form of the following postfix expression:

$A B C < C D > \parallel ! \&\& ! C E < \parallel$

**Answers:**

## Output

1)	1.	3	2	1	0
	2.	2	3	1	0
	3.	2	1	3	0
	4.	2	1	0	3
	5.	1	3	2	0
	6.	1	2	3	0
	7.	1	2	0	3
	8.	1	0	2	3
	9.	1	0	3	2
	10.	0	3	2	1
	11.	0	2	3	1
	12.	0	2	1	3
	13.	0	1	2	3
	14.	0	1	3	2

2)

top	Q[0]	Q[1]	Q[2]	Q[3]	Comments
-1					stack is empty
0	$T_1$				Push $T_1$
1	$T_1$	$T_2$			Push $T_2$
2	$T_1$	$T_2$	$T_3$		Push $T_3$
1	$T_1$	$T_2$			Pop
2	$T_1$	$T_2$	$T_4$		Push $T_4$
3	$T_1$	$T_2$	$T_4$	$T_5$	Push $T_5$
3	$T_1$	$T_2$	$T_4$	$T_5$	Push $T_6$

3)

front	rear	Q[0]	Q[1]	Q[2]	Q[3]	Comments
-1	-1					queue is empty
-1	0	$T_1$				add $T_1$
-1	1	$T_1$	$T_2$			add $T_2$
-1	2	$T_1$	$T_2$	$T_3$		add $T_3$
0	2		$T_2$	$T_3$		delete
0	3		$T_2$	$T_3$	$T_4$	add $T_4$
0	3		$T_2$	$T_3$	$T_4$	add $T_5$
0	3		$T_2$	$T_3$	$T_4$	add $T_6$

4)

front	rear	Q[0]	Q[1]	Q[2]	Q[3]	Comments
0	0					queue is empty
0	1		$T_1$			add
0	2		$T_1$	$T_2$		add
0	3		$T_1$	$T_2$	$T_3$	add
1	3			$T_2$	$T_3$	delete
1	0	$T_4$		$T_2$	$T_3$	add
1	0	$T_4$		$T_2$	$T_3$	add
2	0	$T_4$			$T_3$	delete
3	0	$T_4$				delete

5) a.  $AB + C * DEF G * + / + H -$

b.  $AB \& \& C || EF > ! ||$

6)  $! ( A \& \& !((B < C) || (C > D)) || (C < E))$