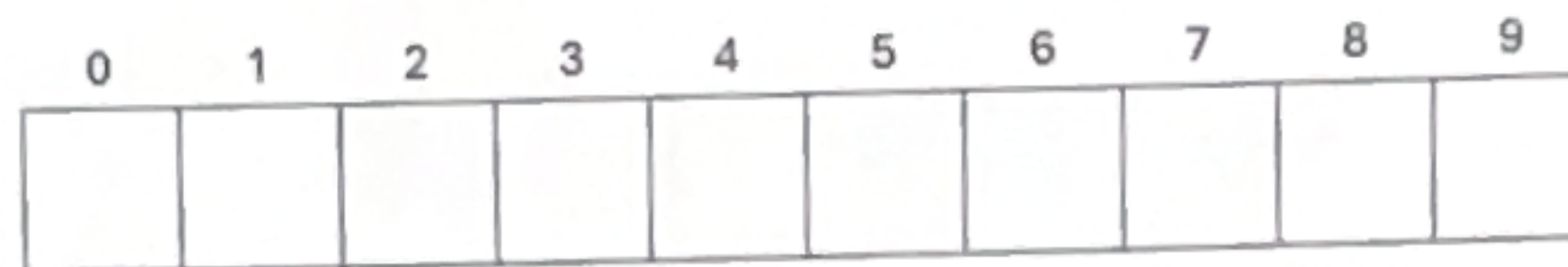52

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Data Structures: Visualization

(1) Array

0	1	2	3	4	5	6	7	8	9

(2) Linked List

Head →

| 5 | • | → | 4 | • | → | 3 | • | → | 2 | • | → | 1 | • | → | 0 | • | →

NULL

(3) Stack

push ↘ ↗ pop

(4) Queue

0	1	2	3	4	5	6	7
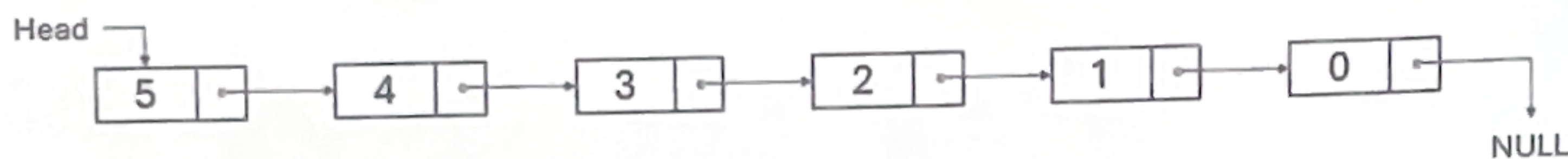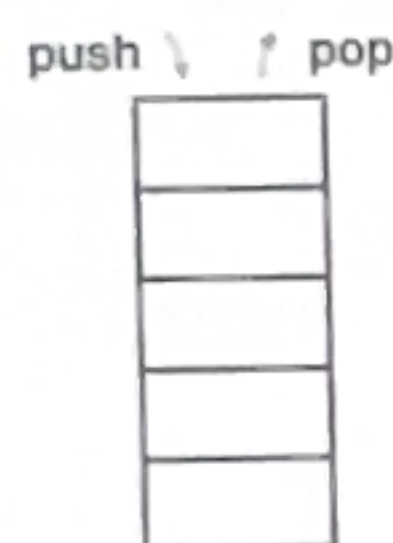
← dequeue   ← enqueue
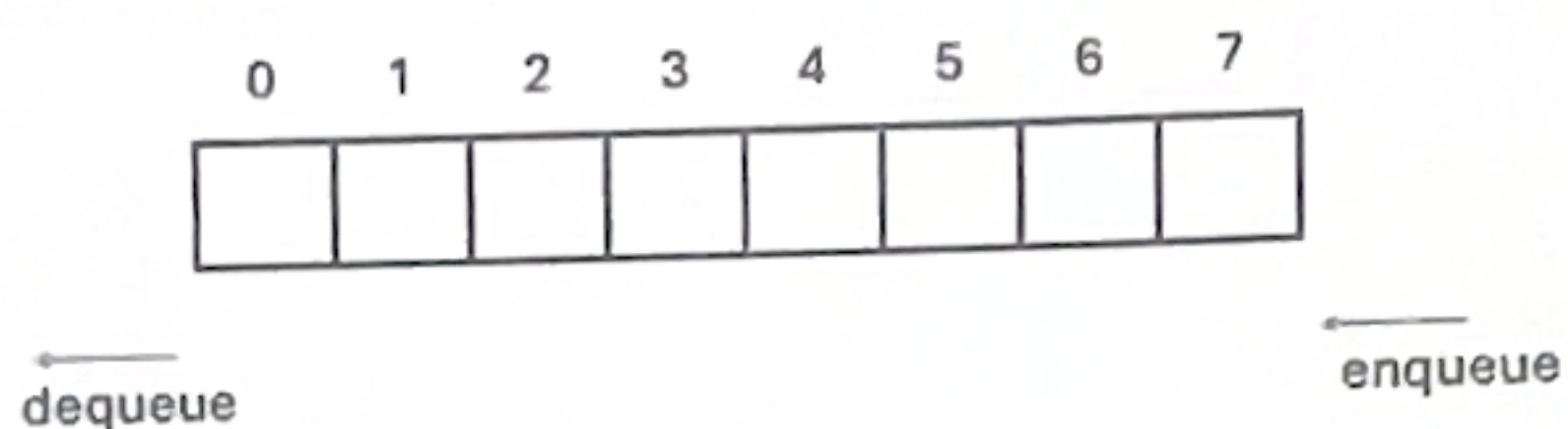

Q1: (30 pts; 10 pts for each) Describe the mechanism of the function

MoveTo(node *head, node *target, node*destination)

A1: Write a short paragraph explaining how the **MoveTo** function works (you may answer in English or Mandarin).

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① Are there any **additional variables** required? If so, explain why they are necessary.

有 head 指標，把 target 移至 destination。⇒ 利用指標移動。⇒ target →next = destination →next
移動需要指標 ex: target →next, ⇒ additional variables   b→next = target
destination →next ⎫
                  ⎬ b
                  ⎭

② Draw a visualization of the singly linked list to support your explanation.

Head ⌐

☐ → ☐ → ☐ → ☐ → ☐   target →next = destination →next
    ↑   ↑   b→next = target
  target b destination

③ Is there any **variation of a linked list** (e.g., doubly linked list or circular linked list) that can simplify or improve this operation? doubly linked list 有雙向的指標、⇒ 可增加效率

Q2: (40 pts, 10 pts for each) **Definition of Data Structures**
Define the following data structures and list their fundamental operations.
A2:

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① Definition of "Stack"

top, bottom 又有一个出口 後進先出

② Definition of "Queue"

pop, push, rear, front 分別有出口入口 先進先出

ADT
③ Preliminary operations of "Stack"

top, bottom, max-size

④ Preliminary operations of "Queues"

push, pop, rear, front, max-size, dequeue enqueue

Q3: (30 pts) **AI Copilot Application**
Choose **up to two** data structures from the visualization list above.
Compose a **single prompt (within 300 words)** that you would use with an **AI Copilot** to explore or learn advanced concepts related to your chosen data structures.

A3: ① Queue

② stack,

與生活結合
請分別舉出相關例子, 並比較不同執行方式的成本高低, 效率,
(ex = array, link list)

以及若使用低效率和 高成本的方式, 還會遇到哪些問題？並回答哪些方法可以解決？如何提高效率及降低成本？並說明原因

做完詳細的描述後, 再幫我做一個整理的表格

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