

论题 1-5 作业

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1 [DH] Problem 2.10

Let T be a vector of Booleans.

- (1) for I going from 1 to N do the following:
 - (1.1) $T[I] \leftarrow \text{false}$;
- (2) for I going from 1 to N do the following:
 - (2.1) if $P[I] < 1$ or $P[I] > N$ do the following:
 - (2.2.1) output 'NO';
 - (2.2.2) end;
 - (2.2) $T[P[I]] = \text{true}$;
- (3) for I going from 1 to N do the following:
 - (3.1) if $T[I] = \text{false}$ do the following:
 - (3.1.1) output 'NO';
 - (3.1.2) end;
- (4) output 'YES'.

2 [DH] Problem 2.11

Let K be a vector of Booleans, L be a vector of integers which stores a permutation.

subroutine **produce permutation** I

- (1) if $I = N$ do the following:
 - (1.1) output R ;
 - (1.2) return;
- (2) for i going from 1 to N do the following:
 - (2.1) if $K[i]$ is false do the following:
 - (2.2.1) $R[i] \leftarrow i$
 - (2.2.2) $K[i] \leftarrow \text{true}$;
 - (2.2.3) call **produce permutation** $I + 1$
 - (2.2.4) $K[i] \leftarrow \text{false}$;

(1) i going from 1 to N do the following:

(1.1) $K[i] \leftarrow \text{false};$

(2) call **produce permutation** 0.

3 [DH] Problem 2.12

- (a) i. **read(X), push(X,S), read(X), push(X,S), read(X), print(X), pop(X,S), print(X), pop(X,S), print(X)**
- ii. **read(X), push(X,S), read(X), push(X,S), read(X), print(X), read(X), print(X), pop(X,S), print(X), pop(X,S), print(X)**
- iii. **read(X), push(X,S), read(X), push(X,S), read(X), print(X), read(X), push(X,S), read(X), print(X), read(X), push(X,S), read(X), print(X), pop(X,S), print(X), read(X), print(X), pop(X,S), print(X), read(X), print(X), pop(X,S), print(X), read(X), print(X), pop(X,S), print(X)**
- (b) i. 要生成 (3, 1, 2) 这个排列, 由于 3 是最先输出的, 1, 2 依次在栈中, 此时若要继续输出, 必然是以 2, 1 的形式输出, 所以不可能用栈生成 (3, 1, 2) 这个排列。□
- ii. 要生成 (4, 5, 3, 7, 2, 1, 6) 这个排列, 当输出 7 时, 栈中剩余的元素依次为 1, 2, 6, 下一个需要输出 2, 但输出 2 之前 6 必须输出, 从而不可能用栈生成 (4, 5, 3, 7, 2, 1, 6) 这个排列。□
- (c) 容易验证, 以下排列可以用栈生成:

(1, 2, 3, 4) (1, 2, 4, 3) (1, 3, 2, 4) (1, 3, 4, 2) (1, 4, 3, 2) (2, 1, 3, 4) (2, 1, 4, 3)
(2, 3, 1, 4) (2, 3, 4, 1) (2, 4, 3, 1) (3, 2, 1, 4) (3, 2, 4, 1) (3, 4, 2, 1) (4, 3, 2, 1)

以下排列不能用栈生成:

(1, 4, 2, 3) (2, 4, 1, 3) (3, 1, 2, 4) (3, 1, 4, 2) (3, 4, 1, 2) (4, 1, 2, 3) (4, 1, 3, 2)
(4, 2, 3, 1) (4, 2, 1, 3) (4, 3, 1, 2)

所以共有 10 个排列不能用栈生成。

4 [DH] Problem 2.13

5 [DH] Problem 2.14

6 [DH] Problem 2.15

7 [DH] Problem 2.16