Programming – 1st Coding Test – A version

There are 45 minutes available. For a good solution maximum 30 points could be reached. During the work you are not allowed to talk, to use cell phones or internet. Remember! Cheating is not allowed, and action will be taken.

Before you start

- You can use printed or written papers.
- The first two lines of your code should contain the date, the test version (A) and your Name and Neptun code in comment.
- You have to write the "reading the inputs" and the "writing the outputs" part in your code.
- Don't forget to check the preconditions!
- When you are done, upload your main.cpp file to Canvas (B1 coding test assignment).

Task:

We measured the lowest (minimum) and the highest (maximum) temperatures for N days. Give the number and the index of the days when the difference between the lowest and the highest temperature was the biggest. Give all day's index with these biggest difference!

Specification

Input: $N \in \mathbb{N}; Days_{1..N} \in Temp^N; Temp = (maxt \times mint); maxt, mint \in \mathbb{N}$

Output: $NCnt \in \mathbb{N}; OutDays_{1..N} \in \mathbb{N}^N; MaxDif \in \mathbb{N};$

Precondition: $N \geq 0; \forall i\ (1 \leq i \leq N): Days_i.maxt \geq Days_i.mint;$

Postcondition: $1 \leq NCnt \leq N$ and $NCnt = \underbrace{\sum_{i=1}^{N} 1}_{Days_i.maxt - Days_i.mint = MaxDif}$ and

$$\forall i\ (1 \leq i \leq NCnt): Days_{OutDays_i.maxt} - Days_{OutDays_i.mint} = MaxDif \text{ and}$$

$$\forall i\ (1 \leq i \leq N)\ i \notin OutDays: MaxDif > Days_i.maxt - Days_i.mint \text{ and}$$

$$OutDays \subseteq \{1,2,\dots,N\}$$

Algorithm

MaxHomDif

In: N, Days[]
MaxDif:=Days[1].maxt-Days[1].mint
NCnt:=1
OutDays[1]:=1
i:=2..N
(Days[i].maxt-Days[i].mint=MaxDif) — T: NCnt:=NCnt+1; OutDays[NCnt]:=i — F: -
(Days[i].maxt-Days[i].mint>MaxDif) — T: NCnt:=1; OutDays[NCnt]:=i; MaxDif:=Days[i].maxt-Days[i].mint — F: -
Out: NCnt, OutDays[]

Programming – 1st Coding Test – B version

There are 45 minutes available. For a good solution maximum 30 points could be reached. During the work you are not allowed to talk, to use cell phones or internet. Remember! Cheating is not allowed, and action will be taken.

Before you start

- You can use printed or written papers.
- The first two lines of your code should contain the date, the test version (B) and your Name and Neptun code in comment.
- You have to write the "reading the inputs" and the "writing the outputs" part in your code.
- Don't forget to check the preconditions!
- When you are done, upload your main.cpp file to Canvas (B1 coding test assignment).

Task:

We measured the lowest (minimum) and the highest (maximum) temperatures for N days. Give the number and the index of the days when the difference between the lowest and the highest temperature was the smallest. Give all day's index with these smallest difference!

Specification

Input: $N \in \mathbb{N}; Days_{1..N} \in Temp^N; Temp = (maxt \times mint); maxt, mint \in \mathbb{N}$

Output: $NCnt \in \mathbb{N}; OutDays_{1..N} \in \mathbb{N}^N; MinDif \in \mathbb{N};$

Precondition: $N \geq 0; \forall i\ (1 \leq i \leq N): Days_i.maxt \geq Days_i.mint;$

Postcondition: $1 \leq NCnt \leq N$ and $NCnt = \underbrace{\sum_{i=1}^{N} 1}_{Days_i.maxt - Days_i.mint = MinDif}$ and

$$\forall i\ (1 \leq i \leq NCnt): Days_{OutDays_i.maxt} - Days_{OutDays_i.mint} = MinDif \text{ and}$$

$$\forall i\ (1 \leq i \leq N)\ i \notin OutDays: MinDif < Days_i.maxt - Days_i.mint \text{ and}$$

$$OutDays \subseteq \{1,2,\dots,N\}$$

Algorithm