

Do 2 questions from Section A and 1 question from Section B

Section A.

Q1. (weighted 25%)

Given $f[0..N]$ of int, where $1 \leq N$. $f.0$ and $f.N$ have opposite sign. Construct an efficient program to find an index i in f which has the property that $f.i$ and $f.(i+1)$ have opposite sign.

Q2. (weighted 25%)

(a) Given $f[500..1000]$ of int, construct a program to determine the product of the odd values in the 2nd half of f .

(b) Given $g[0..100]$ of int and $h[1000..2000]$ of int, construct a program to determine whether g is an exact copy of h .

Q3. (weighted 25%)

Given the f function defined as follows.

$f : \text{natural} \rightarrow \text{natural}$

- * (0) $f.0 = 0$
- * (1) $f.1 = 1$
- * (2) $f.(2^n) = 2^{f.n} \quad , 0 < n$
- * (3) $f.(2^{n+1}) = 3^{f.n} + f.(n+1) + 3 \quad , 0 < n$

Given a natural number N , write a program to compute $f.N$

Section B.

Q4. (weighted 50%)

Given $f[0..N]$ of int, $1 \leq N$, determine the length of the longest increasing segment in f .

Q5. (weighted 50%)

Given an array $f[0..N]$ of int, $0 \leq N$, construct an algorithm to compute the length of the longest segment in f which only contains negative values