

CSE 101: Homework 4

Due: Day 20

Exercises

1. *20 pts.*

Your professor thinks loop invariants are crucial, and will continue to ask questions about them!

Following is an algorithm that correctly calculates the minimum of an array of n values.

Function `Min(A, n)`

Precondition: _____

Begin

`min = A[1];`

`i = 2;`

Loop

Loop Invariant: _____

Exit when `i = n+1`

if `A[i] < min`

`min = A[i]`

`i = i + 1`

Endloop

End

Postcondition: `min` is the minimum element in `A[1..n]`

- (a) *10 pts.* Fill in the Precondition and Loop Invariant necessary to prove the Postcondition.
- (b) *10 pts.* Prove the algorithm is true by proving the Loop Invariant and Postcondition. When you prove the Postcondition, the only information you may use from the loop is the Loop Invariant and Exit Condition.

2. *Kleinberg Chapter 7, Exercise 2. 20 pts.*

3. *Kleinberg Chapter 7, Exercise 4. 20 pts.*

4. *Kleinberg Chapter 7, Exercise 7. 20 pts.*

5. *Kleinberg Chapter 7, Exercise 8. 20 pts.*

Note that in the table of blood types, the demand for *B* should be 10 rather than 8 (although that shouldn't significantly affect your answer).

6. *Kleinberg Chapter 7, Exercise 28. Extra credit, 25 pts.*