CSC236 fall 2018

correct after & before

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Using Introduction to the Theory of Computation, Chapter 2

Computer Science
UNIVERSITY OF TORONTO

Outline

iterative binary search

power

notes

correctness by design

draw pictures of before, during, after

pre: A sorted, comparable with x

post: $0 \leq b \leq n$ and A[0:b] $< x \leq$A[b:n-1]

“derive” conditions from pictures

need notation for mutation

partial correctness

precondition+execution+termination imply postcondition

loop invariant helps get us closer

do we have termination?

correctness by discovery

integer power

```
def power(x, y) :
  z = 1
  m = 0
  while m < y :
    z = z * x
    m = m + 1
  return z
```

- precondition?
- postcondition?
- notation for mutation

partial correctness

precondition+execution+termination imply postcondition

a loop invariant helps get us closer

partial correctness

precondition+execution+termination imply postcondition

a loop invariant helps get us closer

prove partial correctness

prove termination

associate a decreasing sequence in $\mathbb{N}$ with loop iterations

it helps to add claims to the loop invariant

put it together — correctness

notes