CSC236 fall 2018

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Using Introduction to the Theory of Computation,
Chapter 2
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