Jason Wang

jsw50

CS230

September 13, 2017

Short Assignment 5

To uphold the Duke Community Standard:

* I will not lie, cheat, or steal in my academic endeavors;
* I will conduct myself honorably in all my endeavors; and
* I will act if the Standard is compromised.

Jason Wang

(define square-int

(lambda ((n <integer>))

(if (= n 0)

0

(+ n (- n 1) (square-int (- n 1))))))

Proof by induction on variable n

P(n): (square-int n) = n^2

Base Case:

Prove that (square-int {0}) = 0^2

(square-int {0}) by the substitution model is:

(if (= {0} 0)

0

which is {0} and that is right as 0 = 0

Inductive Hypothesis:

There exists k, an element of the set of all natural numbers, less than n such that

(square-int k) = k^2

Inductive Step:

By the substitution model:

[{proc ((n <integer>)) …} {k+1}]

As k+1 > k and k is a natural number, k+1 > 0 so

[if ({#f})

(+ {k+1} (- {k+1} 1) (square-int (- {k+1} 1)))]

Which simplifies to:

(+ {k+1} {k} (square-int({k})))

By the inductive hypothesis,

(+ {k+1} {k} k^2)

= k^2 + 2k + 1 = (k+1)^2

Thus by induction, (square-int n) = n^2