Hans Weeks
Software Specifications
September 24, 2017

Homework 4

Concept:
μ = number of cells without final label. this is a well founded metric because...
$\mu = \langle \sum a :: \neg \textit{final label } a \rangle$
show:
$\mu = k > 0 \leadsto \mu < k$
$\mu = 0 \implies post$

1. init $\leadsto$ post
   let's define μ:

   $\mu = \langle\ \Sigma\ \forall\ x : \pi(x) :: L(x) \neq \lambda(x)\ \rangle$

   $\mu = k \leadsto \mu < k$

   because

   $\pi(x) = (i, j) \wedge L(x) \neq \lambda(x) \wedge \pi(y) = (p, q) \wedge L(y) = \lambda(y)$

   $L(i, j) := min(L(i, j), L(p, q))\ if\ SameRegion((i, j), (p, q))\ ensures\ L(x) = \lambda(x)$

   $\langle \forall x\ : \pi(x) = (i, j)\ :: \exists\ i, j : 0 \leq i, j \leq N :: L(x) = \lambda(x)\ \rangle$

   //need to show that for every region there exists at least one x such that L(x) = λ(x)
   //need to show that $\mu \implies$ post

2. **stable** post

$$post \equiv \langle \forall x \ : \ \pi(x) \ :: \ L(x) = \lambda(x) \ \rangle$$
$$\wedge \ \langle \forall x, y \ : \pi(x) \ \wedge \pi(x) \wedge \neg(x \Gamma y) :: \ L(x) \neq L(x) \ \rangle$$

$part1:$
$post \equiv \langle \forall x \ : \ \pi(x) \ :: \ L(x) = \lambda(x) \ \rangle$
$//this\ needs\ a\ proof$

$part2:$
$invariant: \langle \forall x, y : \pi(x) \ \wedge \ \neg(x \Gamma y) :: L(x) \neq L(y) \rangle$
$because:$
$initially\ L(x) \neq L(y)$
$stable\ L(x) \neq L(y)$