CMPS 101:

BY KAMERON GILL

Date March 15, 2017

- Lemma 1:

  I. Let $x \varepsilon V$, and suppose Initilize (G,s) is executed. Suppose some sequence of calls to Ralx(,) reults in $d\lfloor x \rfloor < \infty$. Then G contains an s-x Path of weight $d\lfloor x \rfloor$

  II. Let n=# of calls to Relax()

  III. n=0, then only limit d-value is 0, i.e must have x=s. There is an s-s path of weight d(s)=0, namely trivial path.

  IV. Let n>0, Assume for any $u \varepsilon V$ that if d(u) becomes finite after fewer than n Relaxations, than G contains sum path of weight d(u).

  V. We must show that if $x \varepsilon V$, and d(x) becomes finite after n relaxations, then G contains an s-x Path of weight d(x)

  VI. Let $x \varepsilon V$, and suppose some relaxation sequence causes $d(x) < \infty$

  VII. then some edge of form y-x must have been relaxed in the sequence.

  VIII. Let y be the origin of that edge on that call to Relax(y,x), d(x) was set to

  $d(x)=d(y)+w(y,x)$

  Since we suppose this number to be finite, d(y) must have been finite, before the call toe Relax()

  IX. Therefore d(y) becomes finite after fewer than n relaxations.

  X. By the induction hypothesis, G contain an s-y Path of weight d(y)!

  XI. That Path, followed by the edge (y,x) consitute an s-x Path of weight

  $d(x)=d(y)+w(y,x)$ as required

-