(2) General case

→ Some engaged & some free

(Assume: Each woman proposes to each man ≤ once)

Let w be a free woman

m → the most prefered man w has NOT proposed to

→ w proposes to m

Case 2.1: m is free

(m, w) get engaged

Case 2.2: (m, w') are engaged ($w' \neq w$)

Case 2.2.1: $w' > w$ in L_m

Nothing changes

Case 2.2.2: $w > w'$ in L_m

(m, w) get engaged. w' is free.

(3) If all n men & n women are engaged, then all the pairs get married

Once

Obs 1) A man m gets engaged, he remains engaged + he keeps getting engaged to better women.

Obs 2) A woman w keeps getting engaged to worse men.

Q1) Does the algo terminate? (Efficiency)

Q2) Does the algo always output a stable matching?

THEOREM 1: There are $\leq n^2$ iterations of the GS algo.

Pf idea: Notion of "Progress"

for iteration t, $P(t)$ s.t
(i) $1 \leq P(t) \leq U$
(ii) $P(t+1) \geq P(t)+1$
$\Rightarrow$ # Iterations $\leq U$.