

Feb 5

Gale-Shapley algorithm

n men
 n women
 $2n$ pref. list

① Initially all men & women are free

① In a loop:
 A free woman ^{in book man propose} proposes to a man

② You have n matched pairs

Initial state: All n men & n women are free.

① Let w be a free woman

Q1: Which man m should w propose to?

A1: The man m on top of her pref. list

→ w will propose to m

Q2: What should m do?

case 2.1: m accepts the proposal.

Issue → m could get a better person later on.

case 2.2: m rejects the proposal.

Issue → m might not get a better proposal later on.

→ case 2.3: m conditionally accepts

⇒ (m, w) are engaged.

TO BE CONTINUED

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General state: All men/women are either free/engaged

① All n men & n women are engaged

→ Alg. terminates & outputs the engaged pairs as the final output.

ELSE

② \exists a free woman w ?

Q1: Who should w propose to?

A1: Propose to the best man m she HAS NOT proposed yet
→ w proposes to m .

Q2: What should m do?

case 2.1: m is free $\Rightarrow (m, w)$ are engaged

case 2.2.1: m is not free $\rightarrow (m, w')$ are engaged

case 2.2.1: $w' > w$ in L_m (no changes)

case 2.2.2: $w > w'$ in $L_m \Rightarrow (m, w)$ are engaged

w' is free