Sep 20

So far Q0 - Q3: Init : $O(n) \leq O(n^2)$

Query/update : $O(1)$

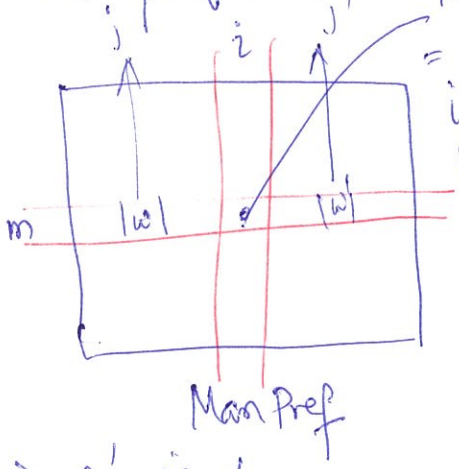
(Q4) Given w & w', who does m prefer?

In a scan of ManPref[m] figure of j & j' s.t

ManPref[m][j] = w

ManPref[m][j'] = w'

& then check if $j < j'$ ⇒ $w > w'$ in L_m



ManPref[m][i] = ID of the ith most preferred woman.

$O(n)$ time ⇒ $O(n)$ iteration

⇒ OVERALL: $O(n^3)$

A stich in time saves nine

Solution: Design another data structure that has $O(n^2)$ init time but answers Q4 in $O(1)$ time.

A graph $G = (V, E)$ $E \subseteq V \times V$

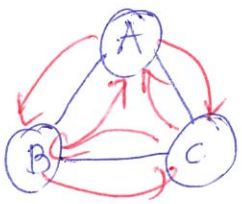
V: set of vertices/nodes

E: edges

Default:

$|V| = n$

$|E| = m$

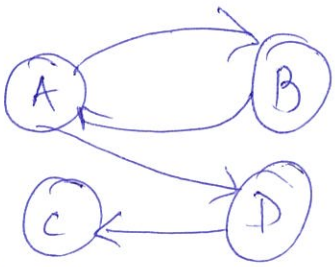


$V = \{A, B, C\}$

$E = \{(A,B), (B,C), (C,A), (B,A), (A,C), (C,B)\}$

$n = 3$

$m = 6$



$V = \{A, B, C, D\}$

$E = \{(A,B), (B,A), (A,D), (D,C)$

Def: G is undirected

$\Leftrightarrow \forall\, u \neq w \in V$

$(u, w) \in E \Rightarrow (w, u) \in E$

If above is not true for all edges then G is directed

for undirected edge we will only keep/store one of $(u,w), (w,u)$

undirect

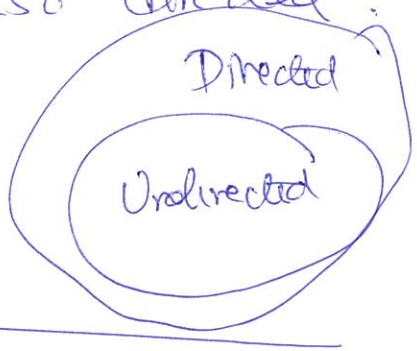
Q) Airline route graph

Q) Wikipedia article (directed)

Default: G is undirected (unless specified o/w)

Claim: Every undirected graph is also directed.

Pf: 



Paths

D, C, B, A ✓

A, B, C, D ✓

A, B, C, B ✓

A, C, D ✗

A ✓