Kruskal's Algorithm.

prove { first conditions.
invariance. from B36

{ 1. each cluster is a tree
2. $T \subseteq T_{min}$ for some MST T_{min}.

In vertices in cluster is connected & no cycle
↳ reacheable from the other

why important?

maintain the invariant for each loop.

$T \subseteq T_{min}$. for some minimum spaning tree.

keep adding edges → MST ↗.

line 4-7

assume (1), (2).

WTP: (1), (2). after line 7.

merging u.cluster & v.cluster

↓

connect with no cycle. & connected

↓

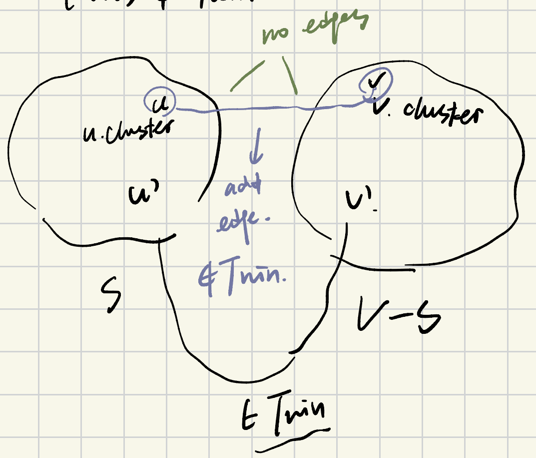
a bigger cluster. ⇐ (1) holds.

1. $T \subseteq T_{min}$ at line 4.

Case: sth change.

$(u, v) \to (u, v) \in T_{min}$ ✓

$(u, v) \to (u, v) \notin T_{min}$



claim
there is a edge.

(u', v')

b/c all MST connect
⇓
there must a way go from
u to v

• in T_{min}, $\exists!$ simple path
from u to v.

• take out $(u', v') \to$ disconnected

• add $(u, v) \to$ reconnected.
⇓
get tree again.

• T_{min}' is minimum ?

weight$((u,v)) \le$
weight$((u', v'))$
b/c the way we store
edges.