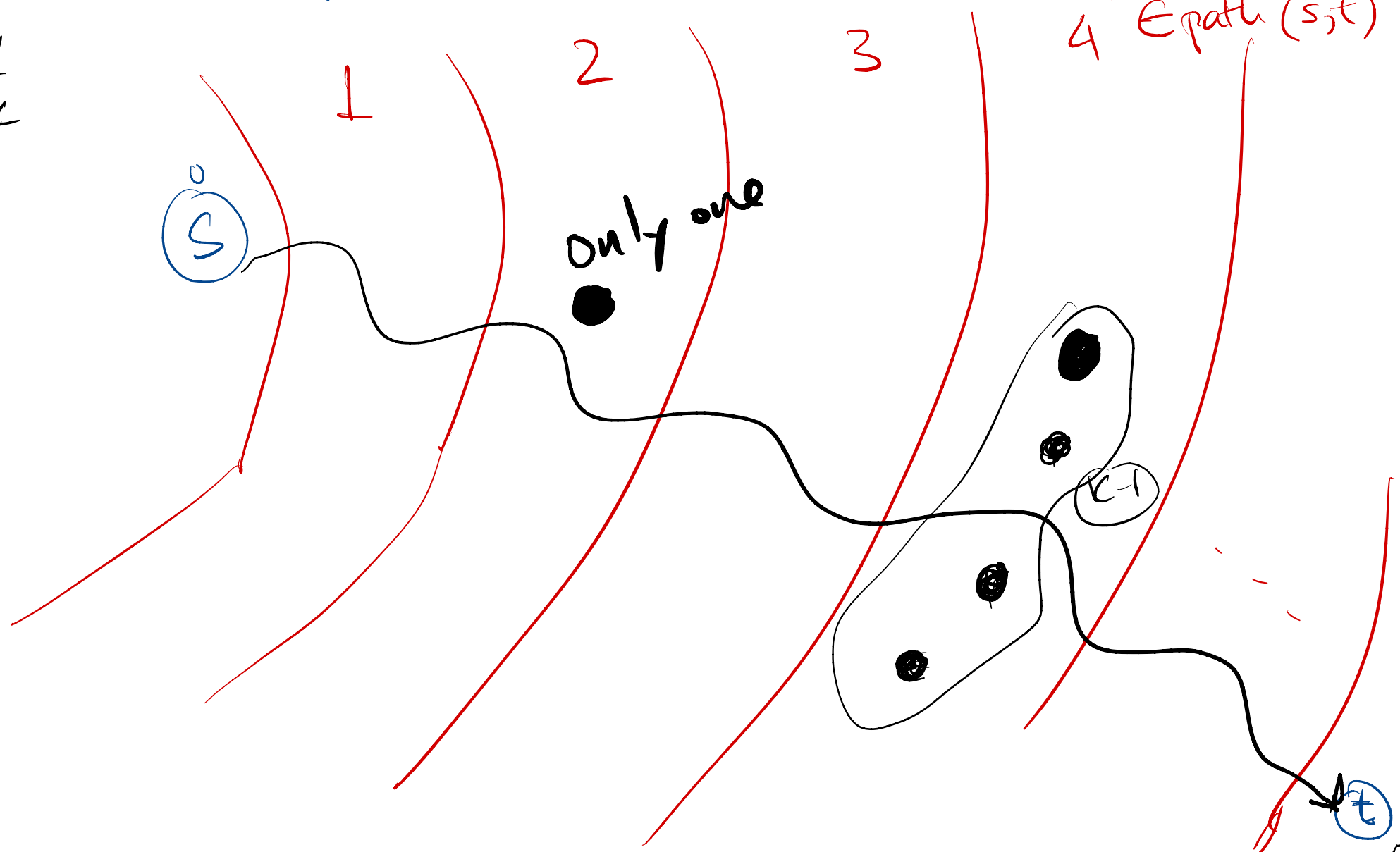


HW 10
PB 8

Hint: From s run BFS and look at #vertices
in each wave

only care of vertices
4 E path (s, t)

$\frac{V}{E}$



- do waves form a partition of the vertex set? $\rightarrow \frac{V}{E}$

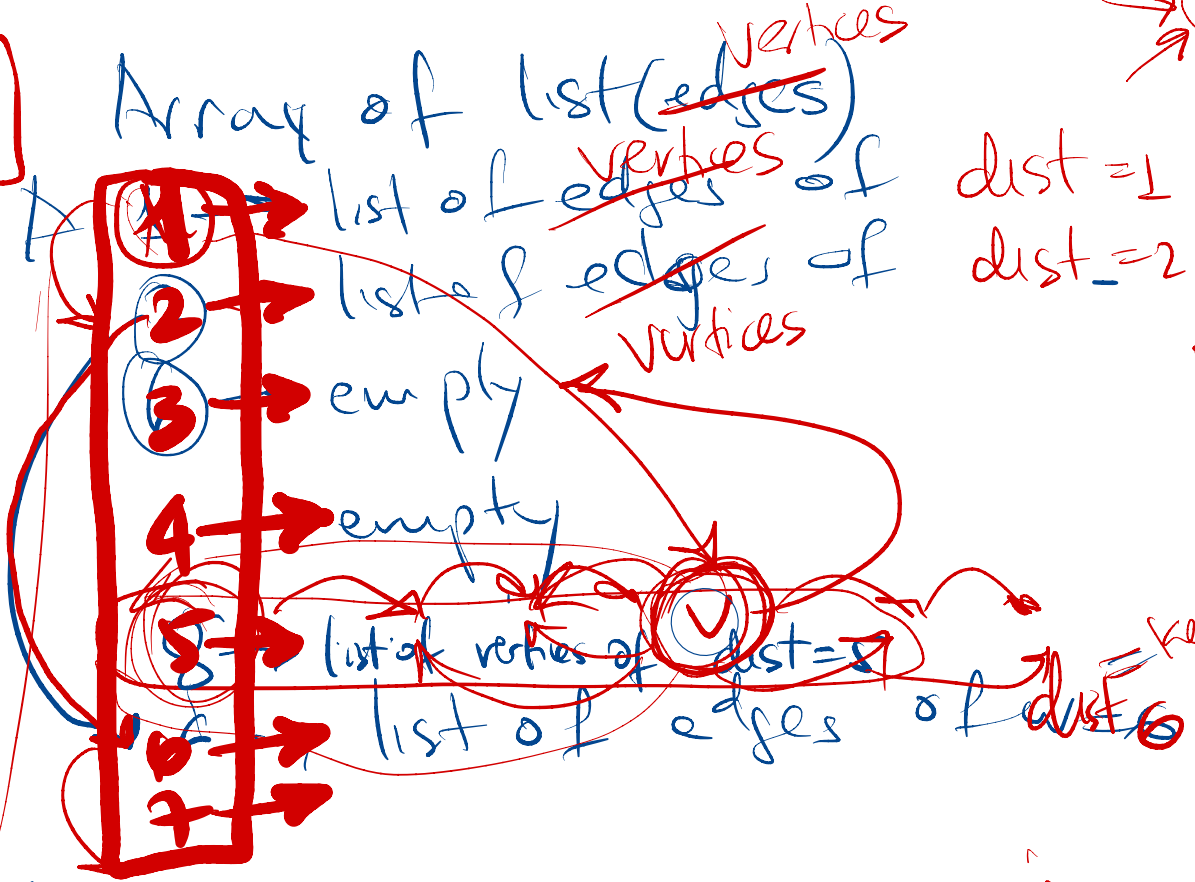
23.2-4

Sort edges faster for pre-kruskal
RT updated for sort part only
- rest of kruskal (FIND-SET(u) etc) SAME

23.2-5

Prim Q

Cruskal
W



dist = 1 to prim tree
dist = 2
- direct access to

v from
Adj list

- check relax
- if update
remove v from
B-list,
add it to G-list

$MQ[v]$ = memory address in Q data structure

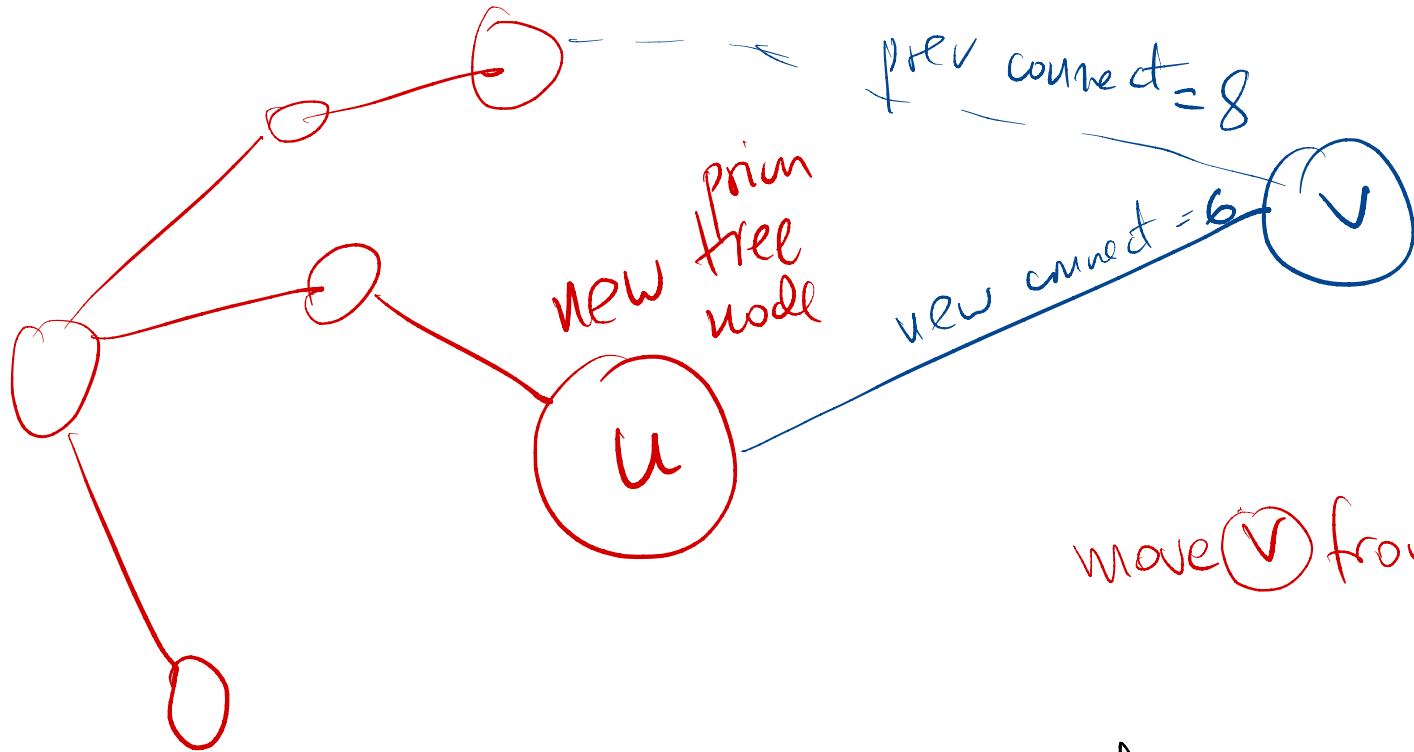
Keep track of used edges, maintain a way
to skip over empty lists.

MST-PRIM(G, w, r)

```
1  for each  $u \in G.V$ 
2       $u.key = \infty$ 
3       $u.\pi = \text{NIL}$ 
4   $r.key = 0$ 
5   $Q = G.V$ 
6  while  $Q \neq \emptyset$ 
7       $u = \text{EXTRACT-MIN}(Q)$ 
8      for each  $v \in G.Adj[u]$ 
9          if  $v \in Q$  and  $w(u, v) < v.key$ 
10              $v.\pi = u$ 
11              $v.key = w(u, v)$ 
```

pointer from $u \rightarrow v$

original



update v

v . parent = u
 v . connect = 6
 (decrease key)

move v from list $w=8$ to
 list $w=6$

decrease key $\Theta(v)$
 (look in list)

\Rightarrow RT $\Theta(E + V^2)$
 worst than Prim + FibH