Nov. 9 (i)

DOM-SET $\leq_p$ k-CENTER

$I_1 \rightsquigarrow I_2 \quad (G', k' = k, r = 1)$

$\left\{ \begin{array}{l} \text{min in opt. pb} \\ \text{fixed in dec. pb} \end{array} \right.$

- $sol(I_1) \Rightarrow sol(I_2)$
  set V sol. to I_1 $\Rightarrow$ pick vertices of V to be centers of I_2.

- $sol(I_2) \Rightarrow sol(I_1)$: V corresponds to centers.

[redacted]

Suppose that we have a $(2-\varepsilon)$-approx algo $\mathcal{A}$ for k-center. $(\varepsilon > 0)$

$I_1 \rightsquigarrow I_2$: Run $\mathcal{A}$ on I_2

- If the sol. of $\mathcal{A}$, $r(C)$, is < 2.
  - $\Rightarrow$ it means $r(C) = 1$ (it is 1 or 2 on I_2)
  - $\Rightarrow$ this sol. is a valid sol. to DOM-SET $\Rightarrow$ ~~ ~~ I_1 has a sol.

- If $r(C) \geq 2$.

$$2 \leq r(C) \leq (2-\varepsilon)\, r(C^*)$$

$\uparrow$ approx ratio

$\Rightarrow r(C^*) \geq \dfrac{2}{2-\varepsilon} > 1$

$\Rightarrow I_1$ has no sol!

$\Rightarrow$ We can answer DOM-SET in poly time, P=NP [redacted]