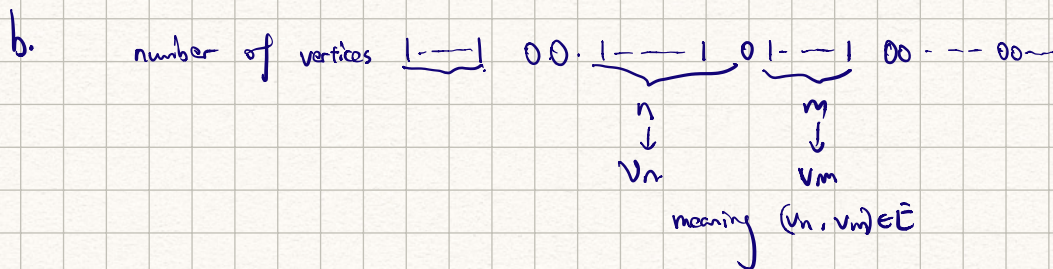
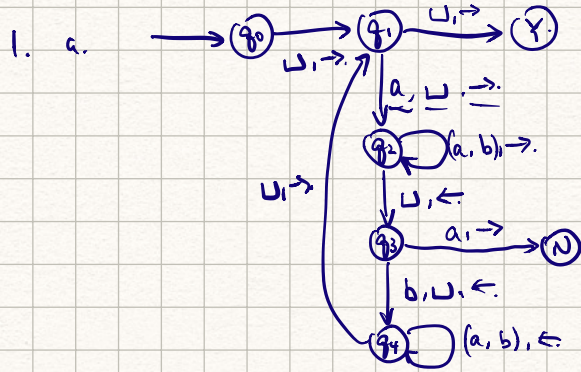


$$A \subseteq B^-$$

$$A^- \subseteq B$$



connected in L

$$\begin{array}{ccc} 11100 & 101100 & 11011 \\ \hline 1-2 & 2-3 & \end{array}$$

not connected.

$$\begin{array}{ccc} 11100 & 1011 & \\ \hline 1-2 & & \end{array}$$

c) Church's thesis
any problem solved involving a step-by-step procedure
can be expressed as a TM.

d) $S = P(N) - P_f(N).$

e)

2. a.

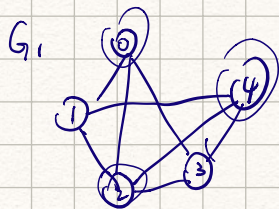
$$NP \leftarrow P^{non-deterministic}$$

$$NPC \quad \text{AENP}$$

$$\forall P \in NP \quad P \leq_P A.$$

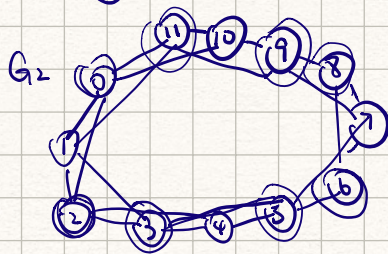
PSPACE tape / space used is in $P(N)$

GCP.
VCP.

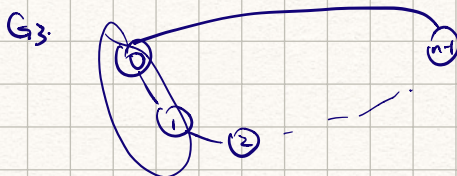


GCP
 $k=3$.
VCP
 $k=3$.

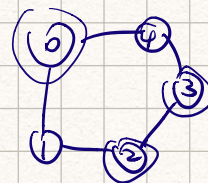
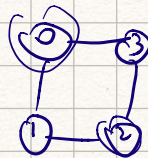
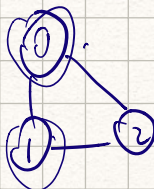
$\{0, 4, 2\}$.



GCP
 $k=3$.
VCP
 $k=8$.



GCP
 $k=2$.



$$\frac{2/n \quad \frac{n+1}{2}}{2/n \quad \frac{n}{2}}$$

d. GCP \in NP.

construct NDTM algo

Set = \emptyset

for v in V

decide if it's added to Set.

if $|Set| > k$ reject.

for v_2 in Set

for v_1 in Set

if $(v_0, v_1) \dots$

if $(v_0, v_1) \in E$ continue
else reject.

accept.

for $i = 0 \sim k$.

e. VCP \leq_p GCP.

f. GCP \leq_p VCP.

g. VCP is NPC.

GCP is also NPC.

GCP \in NP

$\xrightarrow{VCP \leq_p GCP} GCP \in NPC$

Construct a \bar{G} where V remains
 but if $e \in E$ exists in G , remove x in \bar{E}
 otherwise $\bar{e} \in \bar{E}$

$$VCP(G, k) = GCP(\bar{G}, |V| - k)$$

/
 if $(u, v) \in \bar{E}$ $u \in V'$ or $v \in V'$
 $u \notin V'$ and $v \notin V'$ $(u, v) \notin E \rightarrow (u, v) \in \bar{E}$ solution $V - V'$

if $u \in V'$ and $v \in V'$ $(u, v) \in E$.

if $(u, v) \notin E$ then $u \notin V'$ or $v \notin V'$
 \Downarrow \Downarrow
 $(u, v) \in \bar{E}$ $u \in V - V'$ or $v \in V - V'$