1)

# 5/11 Graph and connectivity.

n-Cube $Q_0 = (\{v\}, \emptyset)$

$Q_n = (V, E)$ $V = \{v_0, v_1, \dots v_{2^n-1}\}$,

$Q_n' = (V', E')$ $V' = \{u_0, \dots u_{2^n-1}\}$ $V \cap V' = \emptyset$.

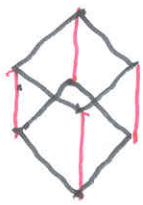
$Q_{n+1} = (V \cup V', E = E \cup E' \cup \{\{v_0, u_0\}, \{v_1, u_1\}, \dots \{v_{2^n-1}, u_{2^n-1}\}\})$

$Q_0$ :

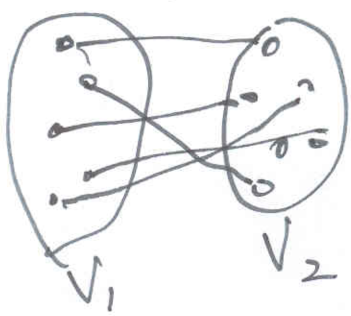
$Q_1$ :

$Q_2$ :

$Q_3$



Bipartite graph $V = V_1 \cup V_2$ where $V_1 \cap V_2 = \emptyset$



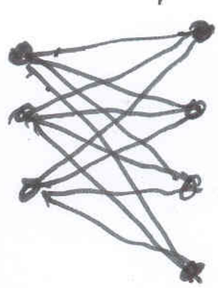

$\forall \{v_1, v_2\} \in E$, $\exists v_1 \in V_1$, $v_2 \in V_2$

$\underline{\{V_1, V_2\}}$ .... partition of $V$

bipartition of $V$

$\underline{bi}$
2

Complete bipartite graph

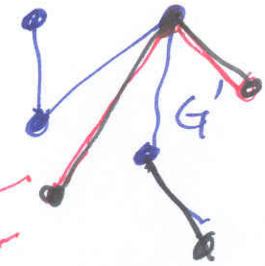


$K_{3,4}$ $K_{n,m}$

Subgraph $G = (V, E)$, $G' = (V', E')$

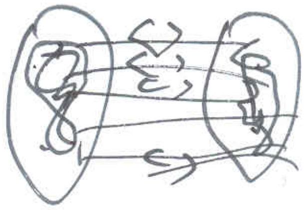
$V' \subseteq V$, $E' \subseteq E$.

$G''$ $E'' = E - E'$
$V = \{a \mid \{a, b\} \in E''\}$




2) $G_1 = (V_1, E_1)$, $G_2 = (V_2, E_2)$

$\exists$ bijection $f$ s.t. $\forall u \forall v \in V_1$ $\{f(u), f(v)\} \in E_2$ iff



$\{u, v\} \in E_1$

Path a seq. of vertices

$(v_0, v_1, \dots, v_n)$ -- $n+1$ vertices
$n$ edges

$(v_0, v_1 \dots v_{n-1}, v_0)$ -- $n$ vertices
$n$ edges

$(v)$ -- path of length 0

$(v, v)$ × in ugraph

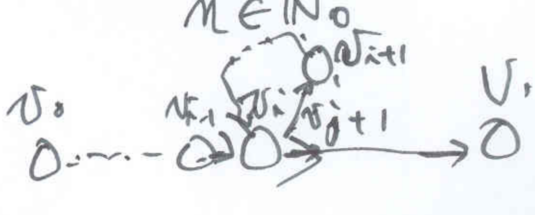
simple path ---- finite

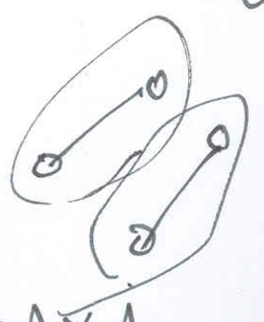
$v_0$ $v_i$ $v_j$ $v_n$ $v_0$ $v_{i-1} (v_i \dots v_j) v_{j+1} \dots v_n$

$v_i = v_j$ $i < j$

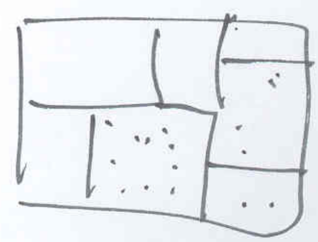
$n \in \mathbb{N}_0$

$0 \le i < j \le n$



$v \in V$ $[v]$ connected ---- connected component



$R \subseteq A \times A$, $R$ is equiv.

$[a]_R = \{b \mid aRb\}$ $a \in A$.