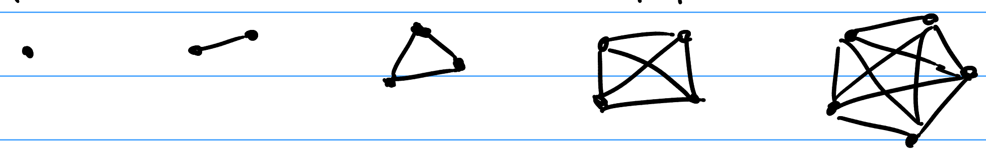
Math 322

Q's Due Next Wed 9.1 (2, 3, 5, 6, 7, 8)

Special Simple Undirected Graphs

① Complete graph K_n ← number of vertices

K_1 K_2 K_3 K_4 K_5



...

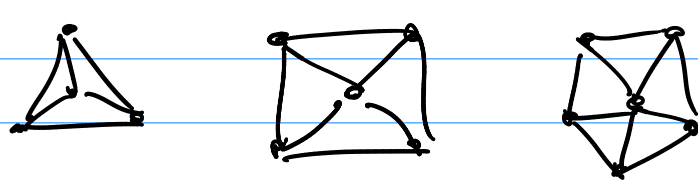
② Cycle $n = 3$ C_n

C_3 C_4 C_5 C_6

...

③ Wheels W_n is C_n with an added axle

W_3 W_4 W_5



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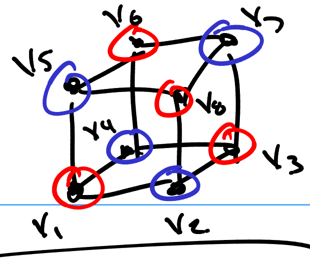
④ bipartite graph $G = (V, E)$

G is bipartite if $V = V_1 \cup V_2$ with $V_1 \cap V_2 = \emptyset$ and all edges connect only between V_1 to/from V_2

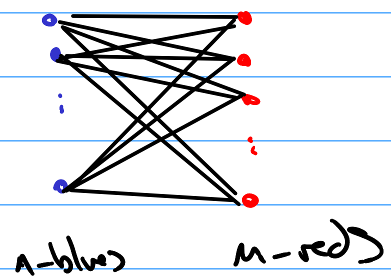


$V = \{v_1, v_3, v_6, v_8\} \cup \{v_2, v_4, v_5, v_7\}$

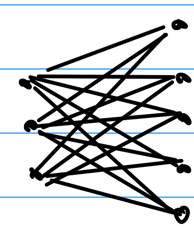
Coloring th^m → color vertices with two colors and only different colors connect then G is bipartite.

(5) Complete bipartite $K_{n,m}$

$V = V_1 \cup V_2$ $\quad |V_1| = n \quad |V_2| = m$



So $K_{3,5}$



New Graphs from Old

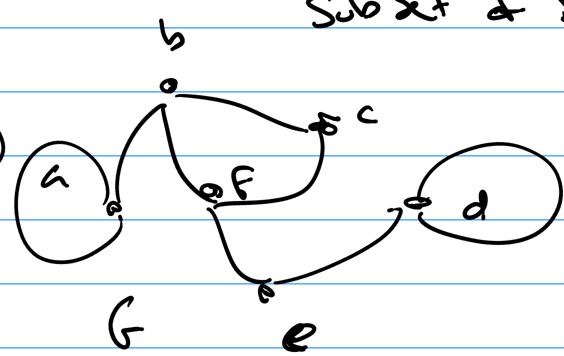
(1) Union $\quad G_1 \cup G_2 \quad G_1 = (V_1, E_1)$

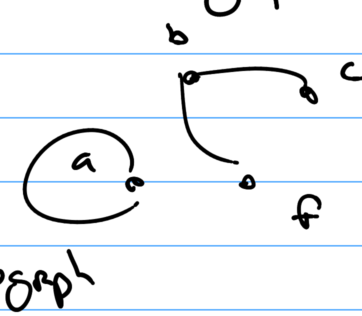
$G_2 = (V_2, E_2)$

$G_1 \cup G_2 = (V_1 \cup V_2, E_1 \cup E_2)$

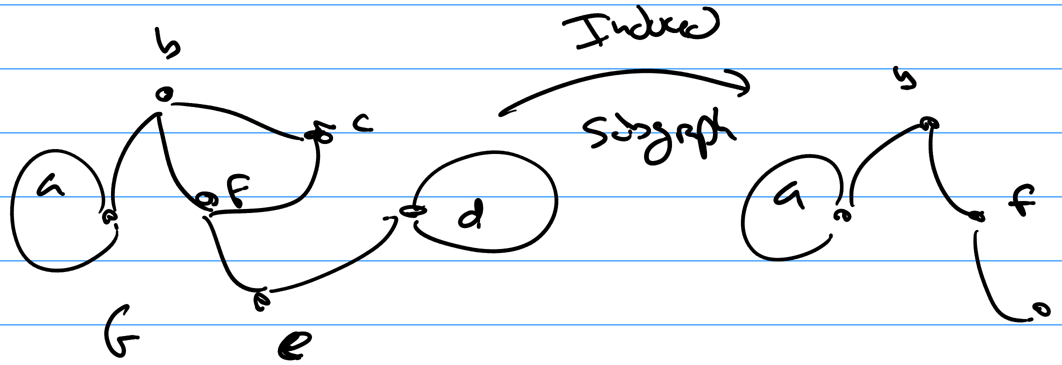
(2) Subgraphs: take a subset of V and a correct subset of E to get a subgraph.

Ex

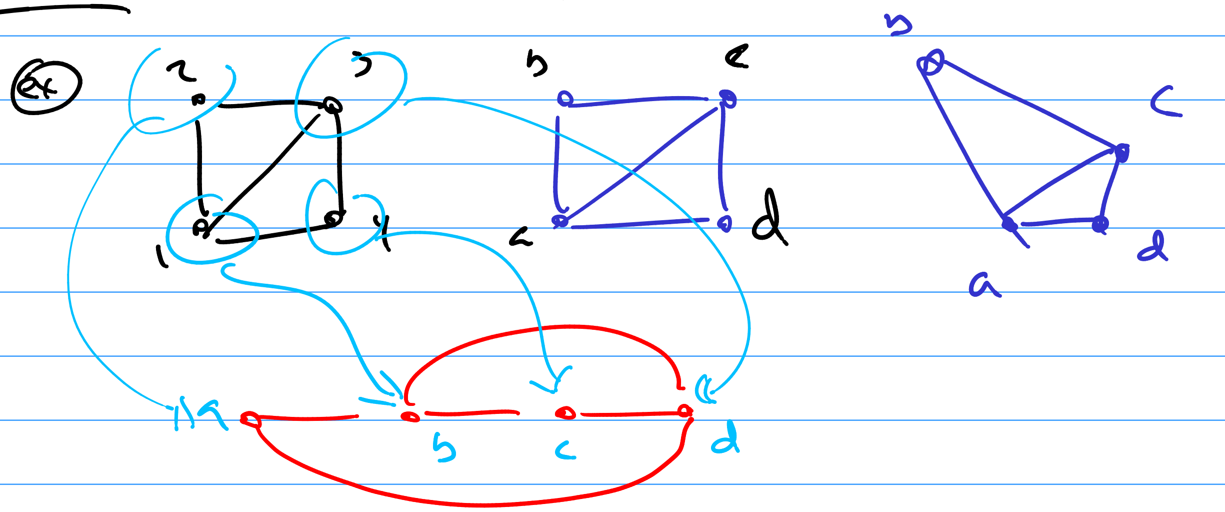




(3) Induced Subgraphs → take sub set of vertices and then [all] relevant edges involving only the subset



"Same"? how to say G_1 is the "same" as G_2?



$G_1 = (V_1, E_1)$ and $G_2 = (V_2, E_2)$ are called isomorphic if

Invariants
(1) $|V_1| = |V_2|$, $|E_1| = |E_2|$
(2) deg(v) all match
(3) paths match
(4) deg & paths and neighborhoods match

and you can find a bijection from V_1 to V_2 that preserves edges.