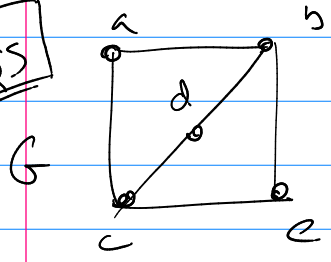
Math 322

Q's



10.5 #35 Hamilton Circuit

$|V| = 5$

check Dirac's: $\deg(x) \geq \frac{|V|}{2}$

this graph: all v $\deg(x) \geq 3$

b/c $\deg(a) = \deg(d) = \deg(e) = 2 \not\geq 3$

Dirac's says nothing

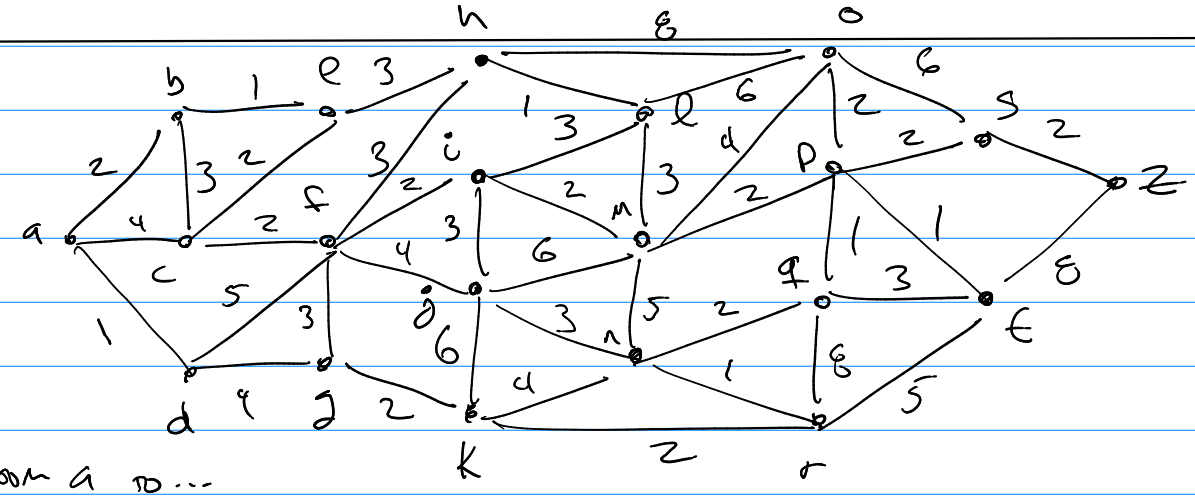
check Ore's: $\deg(x) + \deg(y) \geq |V|$ u,v are non-adj.

but $\deg(a) + \deg(e) = 4 \neq 5$ so doesn't apply.

See video for rest of argument on why no Hamilton circuits.

10.6 #4

$|V| = 21$



Dijkstra's from a to ...

(1) ① a; a cost 0

⋮

(21)

go a to everywhere else (paths + costs)

(2) b to ...

(3) c to ...

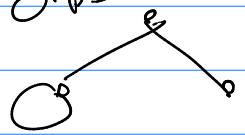
(21) z to ...

all together we have $21 \cdot 20 = 420$ paths

Exam 12 probs → 110 pts = 100%

10.1 / 10.2 (3 probs)

① Name these graphs

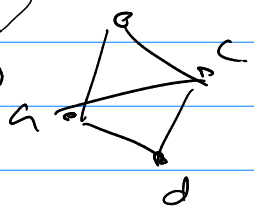
(ex) a)  pseudograph

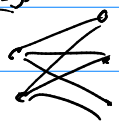
b)  Mixed

c)  Simple directed

d)  directed multigraph

② given $G=(V,E)$ state: $|V|$, $|E|$, $\deg(v)$, $\deg^+(v)$, $\deg^-(v)$

(ex) 

(ex) $K_{3,3}$ 

(ex) Q_3

etc

③ given G_1, G_2 → find a) subgraph induced by subset of V
b) $G_1 \cup G_2$
c) edge contraction.

10.3 Representing $G=(V,E)$ and Isomorphisms (3 probs)

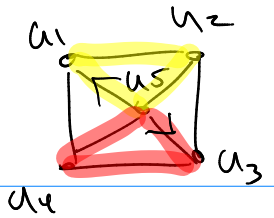
① Given G as  show A_G

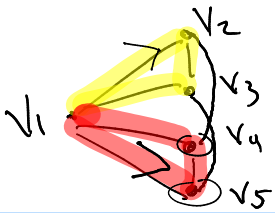
② show G_1, G_2 are not isomorphic

③ show G_1, G_2 are isomorphic
a) find isomorphism
b) A_{G_1}, A_{G_2} in order of isomorphism: $A_{G_1} = A_{G_2}$

ex

5 vertices





u $\qquad$ v

Isomorphism

$u_1 \to v_2$

$u_2 \to v_3$

$u_3 \to v_5$

$u_4 \to v_4$

$u_5 \to v_1$

A_u

	u_1	u_2	u_3	u_4	u_5
u_1	0	1	0	1	1
u_2	1	0	1	0	1
u_3	0	1	0	1	1
u_4	1	0	1	0	1
u_5	1	1	1	1	0

A_v

	v_2	v_3	v_5	v_4	v_1
v_2	0	1	0	1	1
v_3	1	0	1	0	1
v_5	0	1	0	1	1
v_4	1	0	1	0	1
v_1	1	1	1	1	0

10.4 Connectivity (2 probs)

(1) given $G=(V,E)$ $\quad \chi(G)$, $\kappa(G)$, $\min_{v \in V} d_G(v)$

(2) directed graph: strongly, weakly connected?

10.5 Euler / Hamilton Paths / Circuits (3 probs)

(1) state an Euler Circuit.

(2) bridge problem or cut puzzle

(3) Hamilton Circuit problems

→ state / use Dirac's

→ state / use Ore's

→ find or disprove Hamilton circuit.

10.6 Shortest Path (1 prob)

(1) Dijkstra's