

# Math 530

Exam (Tuesday Dec 1) 12 probs & 10pts

Ch 1 to 3.2

11.1 (1 prob)

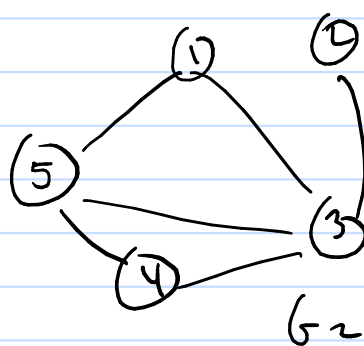
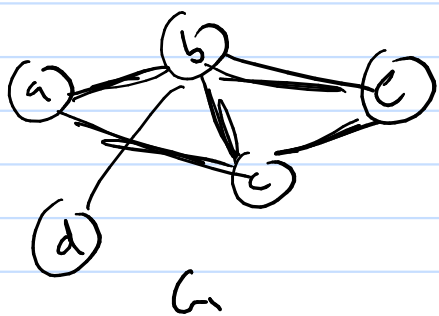
Modeling: people communication model.

(1x) #4 1.1

- draw?
- Adj. Matrix?
- degree, in-deg, out-deg
- $|V|$ ,  $|E|$
- type?
- paths

11.2 Isomorphic Graphs (2 probs)

(1)  $G_1, G_2$  are isomorphic (show)

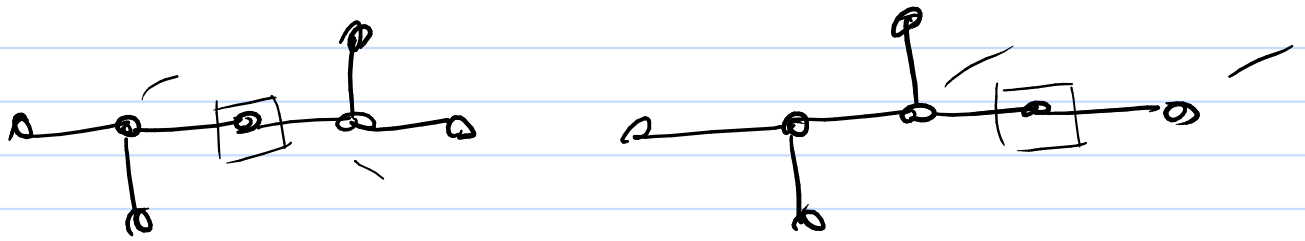


(1) Find isomorphism

$a \rightarrow 1$   
 $b \rightarrow 3$   
 $c \rightarrow 5$   
 $d \rightarrow 2$   
 $e \rightarrow 4$

(2) show  $A_{G_1} = A_{G_2}$

(2)  $G_1, G_2$  are not isomorphic  
 Show / find broken invariants



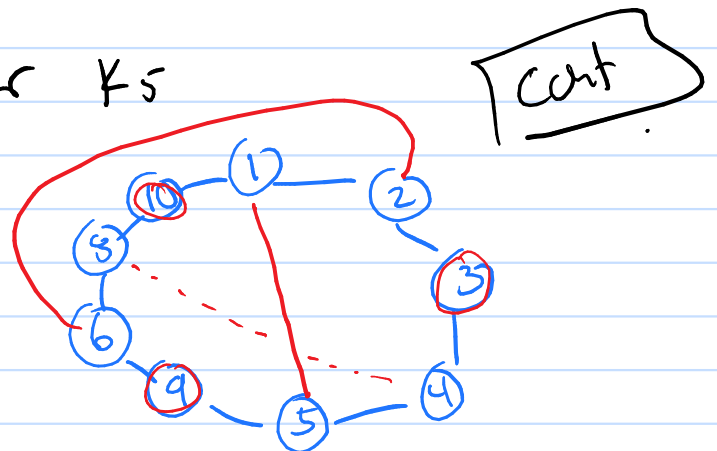
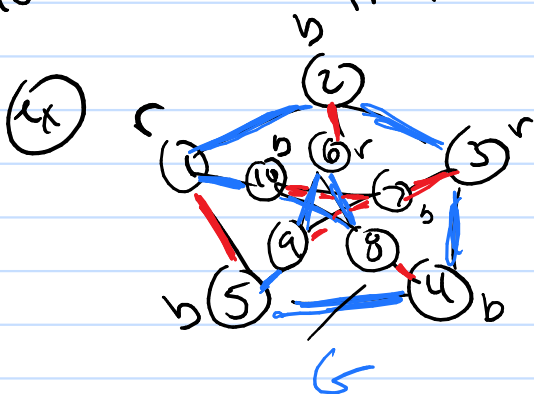
11.3  $\mathbb{Z}^n$ 's involving  $|E|$ , plus bipartite graphs  
 Undirected graph  $\sum_{v \in V} \deg(v) = 2|E|$

Directed graph  $\sum_{v \in V} \deg^+(v) = \sum_{v \in V} \deg^-(v) = |E|$

(2 probs) (1) use the above 2 th<sup>ms</sup>'s  
 (2) bipartite question

11.4 Planar Graphs (2 probs)

yes (1) Is a graph planar? & no  
 no (2) find  $K_{3,3}$  or  $K_5$



## 2.1 Euler Circuits / Paths (2 prob)

(1) cut puzzle (or) can you draw  
(if yes? → solve)

(Euler circuit Path / circuit)

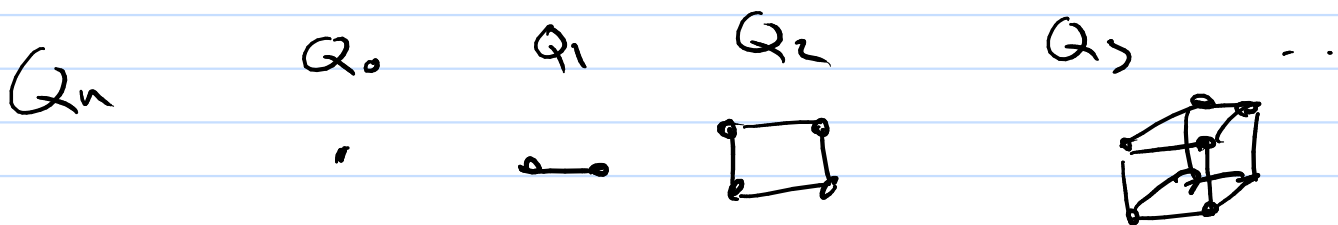
only two  
odd degree

all even degree

(2) discuss Euler Circuits / Paths on

(ex)  $K_n$ ,  $K_{m,n}$ ,  $C_n$ ,  $W_n$ ,  $Q_n$ , etc

(ex) 2.1 #3



## [2.2] Hamiltonian Circuits (1 prob).

(1) test  $G = (V, E)$  with Dirac's th<sup>m</sup>  
→ find or show why it doesn't have  
a Hamiltonian Circuit.

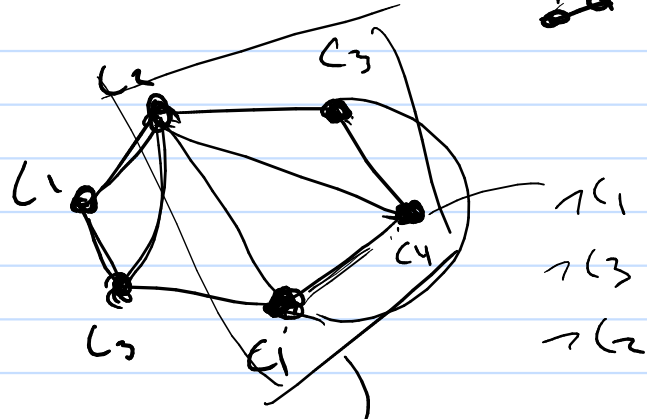
## 12.3 Graph coloring (1 prob)

(1) chromatic number of ...



a)  $G_1$

b)  $G_2$



$K_4$  so 4 colors

## 13.1 Paperweights & Trees (1 prob)

(1) given "n" coins and one maybe fake  
how many uses of balance to  
find and determine the fake. Make  
the tree.

extra credit

given  $G$  find a spanning tree.