Math 322

Q's 9.2 #1 "estimate" ?

$G = (V, E)$ $|V| = ?$ $|E| = ?$

(a) Airlines → cities that have at least one airline

$\sim 8{,}000$ cities $= |V|$

$\sim \deg(v) \approx 10$ (average)

$\deg(v)$ = # of non-zeros in row of A_R

undirected simple graph

$$\sum_{v \in V} \deg(v) = 2|E|$$

$$|E| = \frac{1}{2} \sum_{v \in V} \deg(v)$$

$|E| \approx 40{,}000$

(ex) $|V| \approx 10{,}000$

how many a_{ij}'s? $100{,}000{,}000$

Size of Adj. Matrix $10{,}000 \times 10{,}000$

64 bit system = 8 bytes

2 bytes / "symbol". (ex) float (sign)(sig fig)(Base)

bit: $b_1 \ldots b_{24}$ $\pm$

$\pm$ sig fig 10^{Base}

Exam 12 probs @ 20 pts
110 pts = 100%

6.1 - 6.5, 7.1 - 7.4

① Q's

Work

3/10

- why wrong?
- what to do to fix?

Problems

6.1, 6.2, 6.11 Relations

2 probs

- to do? ① logic to list?

② list → Matrix ↔ digraph

May include Composition

6.3 Properties: reflexive, irreflexive, symmetric, asymmetric, antisymmetric, transitive

4 pbs

① given a relation check all 6 properties.

② Equiv. Relations with application

③ ④ > Posets and Hasse Diagrams

6.5 Closures (2 pbs)

① a) find a ref. closure
b) find a sym. closure

② find the transitive closure

use any technique

① $S^+ = S + S^2 + S^3 + \cdots + S^{|A|}$

② S_{2k+1} loop to get S^+

$S_1 = S$

$S_2 = S_1 \cdot (I + S_1)$

$S_4 = S_2 \cdot (I + S_2)$

⋮

③ Warshall's

Chapter 4 Graphs $G = (V, E)$

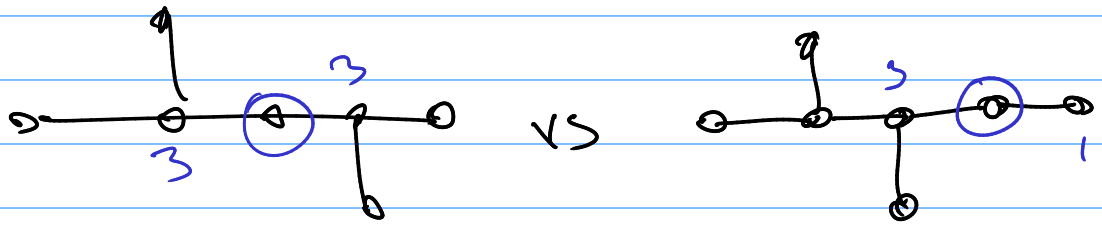
4.1 Graph basics (2 pebs)

① Know K_n, C_n, W_n, bipartite
Know deg, deg⁺, deg⁻ + th^m's
Graph names

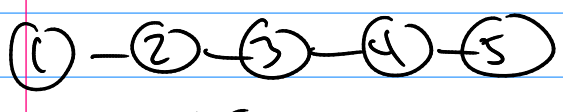
② given G_1 and G_2 (graphs)
are they isomorphic?

if NO → tell me the broken invariant
($|V_1| \neq |V_2|$, $|E_1| \neq |E_2|$,
degrees not match?
paths not match?
neighbors not match?)

ex

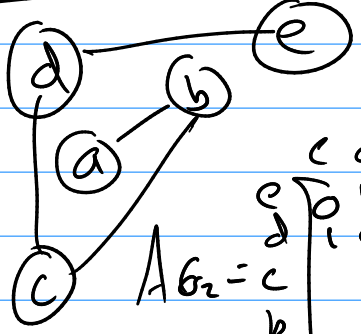


if YES → give isomorphism and adj. matrix



$A_{G_1} = \begin{matrix} & 1 & 2 & 3 & 4 & 5 \\ 1 & 0 & 1 & 0 & 0 & 0 \\ 2 & 1 & 0 & 1 & 0 & 0 \\ 3 & & & & & \\ 4 & & & & & \\ 5 & & & & & \end{matrix}$

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



$A_{G_2} = \begin{matrix} & c & d & c & b & a \\ e & 0 & 1 & 0 & 0 & 0 \\ d & 1 & 0 & 1 & 0 & 0 \\ c & & & & & \\ b & & & & & \\ a & & & & & \end{matrix}$

9.2 (0 pts)

9.3 (1 pts)

① given graph

(a) undirected : connected?
connected components?

(b) directed : strongly connected?
connected / weakly connected?

9.4 (1 pts)

① Euler Path / Circuit Problem
(know this)