Midterm #3

- HW7 Due & Pickup a HW8 handout and old HWs and MTs.
- Midterm #3 on Tuesday 11/28 (Algorithm, Numbers, Graphs, Trees)
  - 6 questions on Algorithms, Numbers, Graphs and Trees.
  - Bring: 1-page handwritten cheatsheet, calculator, scratch papers
  - No reentry after leaving
  - Study with example problems in Lec Notes, HWs, TextBook
  - There will be questions from materials that were not covered by HW questions. You have to study the examples from lec. Notes.

- This Lecture
  - Review for Midterm #3
  - HW6 & HW7 Answers
  - HW7 Answers will be online after this lecture
  - HW6 Answers will not. So take a note of the answers for #6!

Make sure to study all graph material including Hamiltonian Cycle & Eulerian Circuit.

Homework 7 (Total 25 pts)

CSC230 Discrete Math
Kazunori Okada

11/16/17
HW#7 Q1 (3pt)

Show that the sum, over the set of people at a party, of the number of people a person has shaken hands with, is even. Assume that no one shake his or her own hands.

• ANS

Represent this problem by a graph whose vertex is a person. An edge between two people represents that they shake hands. Then the degree of a vertex is equivalent to the number of people that the person (vertex) shook hands with.

By the hand-shaking theorem, the sum of the degrees is even.

\[ 2e = \sum_{v \in V} \deg(v) \]

HW#7 Q2-a (2pt)

Determine this pair of graph is isomorphic or not.

• ANS

A and B are isomorphic.
An example of bijection is:

\[ f(U1) = V1 \]
\[ f(U2) = V3 \]
\[ f(U3) = V5 \]
\[ f(U4) = V2 \]
\[ f(U5) = V4 \]
HW#7 Q2-b (2pt)

Determine this pair of graph isomorphic or not.

- ANS

\[ \text{deg} = 4 \]

A and B are not isomorphic. V2 in B has the degree of 4, but there is no vertex in A that has the degree of 4.

 HW#7 Q2-c (2pt)

Determine this pair of graph isomorphic or not.

- ANS

A and B are isomorphic. An example of bijection is:

\[ f(u_1) = v_5 \]
\[ f(u_2) = v_2 \]
\[ f(u_3) = v_3 \]
\[ f(u_4) = v_6 \]
\[ f(u_5) = v_4 \]
\[ f(u_6) = v_1 \]
HW#7 Q3 (6pt)

Find a shortest path between ‘a’ and ‘z’ in the following graph using Dijkstra’s algorithm

- ANS

\[ d[v] \]: distance function from \( a \) to \( v \)

\[ p[v] \]: previous node of \( v \) in the optimal path from \( a \) to \( v \)

Starting from 'a',
1. \( \text{pop}\ 'a' \rightarrow d[c]=8\), \( p[c]=p[b]=a\), \( \text{no update on 'b' and 'c'} \)
2. \( \text{pop}\ 'b' \rightarrow d[d]=6\), \( p[d]=p[c]=c\), \( \text{no update on 'b' and 'c'} \)
3. \( \text{pop}\ 'c' \rightarrow d[d]=6\), \( p[d]=p[c]=c\), \( \text{no update on 'b' and 'c'} \)
4. \( \text{pop}\ 'd' \rightarrow d[e]=7\), \( d[f]=11\), \( p[f]=p[d]=d\), \( \text{no update on 'b' and 'c'} \)
5. \( \text{pop}\ 'e' \rightarrow d[g]=12\), \( p[g]=e\), \( \text{no update on 'f'} \)
6. \( \text{pop}\ 'f' \rightarrow d[z]=18\), \( p[z]=f\), \( \text{no update on 'b' and 'c'} \)
7. \( \text{pop}\ 'g' \rightarrow d[z]=16\), \( p[z]=g\)

The shortest Path: \( a \rightarrow c \rightarrow d \rightarrow e \rightarrow g \rightarrow z \). path cost: 16

\[ \text{Pr} \]

\[ d[w] \]
HW#7 Q4-a (2pt)

Determine whether the given graph is planar

• ANS

HW#7 Q4-b (2pt)

Determine whether the given graph is planar

• ANS
HW#7 Q5-a (2pt)

List vertices using inorder traversal
• ANS

IN(T), a, IN(T2), IN(T3)

jenkopbfaclgmdhi

HW#7 Q5-b (2pt)

List vertices using preorder traversal
• ANS

a, PR(T1), PR(T2), PR(T3)
a, b, j, k, n, o, p, f, c, d, g, l, m, h, i
HW#7 Q5-c (2pt)

List vertices using postorder traversal

- **ANS**

\[ PO(T_1) \ PO(T_2) \ PO(T_3), \quad a \ \ T_1 \ T_2 \ T_3 \]

\[ jnpkrfbclmghida \]