

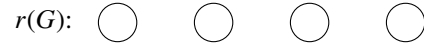
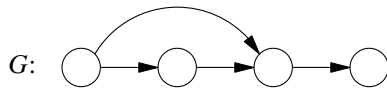
Long Quiz #3.1 (07-Apr): CSC-2259: Discrete Structures, Sp 2020

Your answers must be to the point. Total = 50; marks for each question is shown in []. **There will be another such Take-home Long Quiz #3.2. These two together with total score 100 will replace original Long Quiz #3.**

LastName:

FirstName

1. For the (unlabeled) digraph G shown below, show the links of the reverse-digraph $r(G)$ using the nodes on the right (relative positions of the nodes remain the same). [5]



Show the following for G . [3+3+3+3+3]

- (a) Outdeg-sequence for G :
- (b) Indeg-sequence for G :
- (c) (Total) Degree-sequence:
- (d) Shows #(paths) of lengths 2 and 3 (in that order):
- (e) DegreePair-sequence:

Which of (a)-(e) above help to distinguish between G and $r(G)$? [2]

How many labeled digraphs can you get from G if we label its nodes with $\{a, b, c, d\}$? [3]

2. If two unlabeled digraphs have the same degreePair-sequence, then what can you say about the following. [3+3+3]

- (a) their outdeg-sequence
- (b) their indeg-sequence
- (c) their (total) degree-sequence

Is it true that if two unlabeled digraphs have different outdeg-sequence, then their degreePair-sequence will be different? [3]

Is it true that if two unlabeled digraphs have different indeg-sequence, then their degreePair-sequence will be different? [3]

Consider the three equality-tests of unlabeled (n, m) -digraphs based on: (i) outdeg-sequence, (ii) indeg-sequence, and (iii) degreePair-sequence. Which of these is the most powerful? [3]

3. Give a clear argument that the maximum #(links) in an anti-symmetric relation on n items is $n(n+1)/2$. Also, verify the count $n(n+1)/2$ for $n = 2$ by showing the structure of anti-symmetric relation(s) on X with maximum #(links) when $|X| = 2$. [5+2]