

Unit 7 - Week 5

Course outline

How does an NPTEL online course work?

Week 0

Week 1

Week 2

Week 3

Week 4

Week 5

Lecture 10 Part 1 - Matching in General Graphs

Lecture 10 Part 2 - Proof of Hall's Theorem

Lecture 11 Part 1 - Stable Matching

Lecture 11 Part 2 - Gale-Shapley Algorithm

Lecture 12 Part 1 - Graph Connectivity

Lecture 12 Part 2 - Graph Connectivity

Week 5 Lecture material

Quiz : Week 5 Practice Assignment

Quiz : Assignment 5

Week 5 Feedback : Graph Theory

Assignment 5 solutions

Week 6

Week 7

Week 8

Download Videos

Assignment 5

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment.

Due on 2020-03-04, 23:59 IST.

1) Consider the following instance:

1 point

m_1	w_1	w_2	w_3	w_4
m_2	w_1	w_4	w_3	w_2
m_3	w_2	w_1	w_3	w_4
m_4	w_4	w_2	w_3	w_1

Table 1: Men's preference

w_1	m_4	m_3	m_1	m_2
w_2	m_2	m_4	m_1	m_3
w_3	m_4	m_1	m_2	m_3
w_4	m_3	m_2	m_1	m_4

Table 2: Women's preference

Is the matching $M = \{(m_1, w_4), (m_2, w_3), (m_3, w_1), (m_4, w_2)\}$ a stable matching?

- Yes
 No

No, the answer is incorrect.
Score: 0

Accepted Answers:
No

2) Consider the instance in Problem 1. The man-oriented stable matching obtained by Gale-Shapley algorithm is

1 point

- $\{(m_1, w_1), (m_2, w_4), (m_3, w_3), (m_4, w_2)\}$
 $\{(m_1, w_3), (m_2, w_4), (m_3, w_2), (m_4, w_1)\}$
 $\{(m_1, w_3), (m_2, w_4), (m_3, w_1), (m_4, w_2)\}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
 $\{(m_1, w_3), (m_2, w_4), (m_3, w_1), (m_4, w_2)\}$

3) Consider the instance in Problem 1. The woman-oriented stable matching obtained by Gale-Shapley algorithm is

1 point

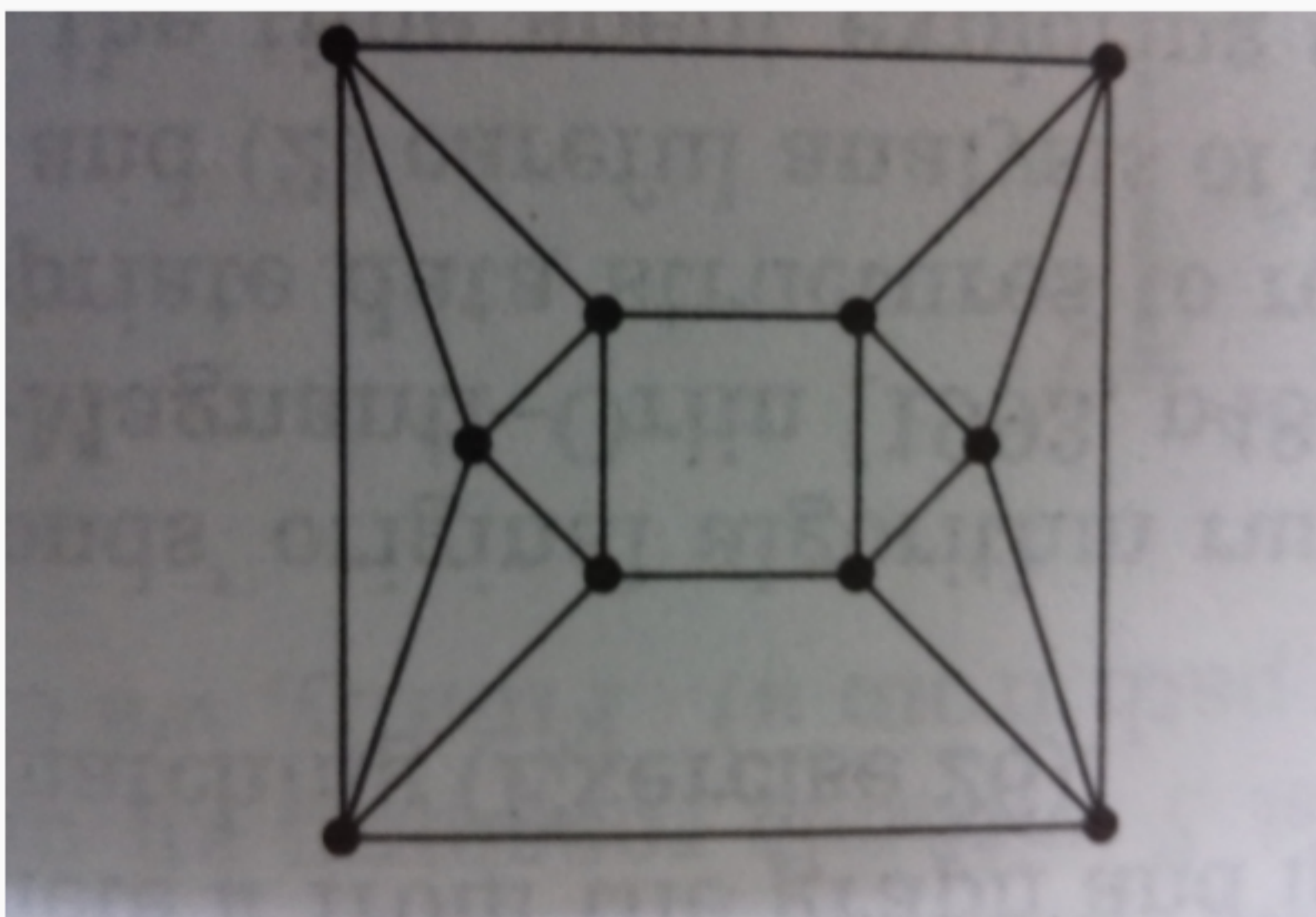
- $\{(w_1, m_3), (w_2, m_4), (w_3, m_1), (w_4, m_2)\}$
 $\{(w_1, m_3), (w_2, m_4), (w_3, m_2), (w_4, m_1)\}$
 $\{(w_1, m_4), (w_2, m_2), (w_3, m_1), (w_4, m_3)\}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
 $\{(w_1, m_3), (w_2, m_4), (w_3, m_1), (w_4, m_2)\}$

4) A k -factor of a graph G is a k -regular spanning subgraph of G . So, a perfect matching of a graph G is a 1-factor of G . Does the graph below have a 2-factor?

1 point



- Yes
 No

No, the answer is incorrect.
Score: 0

Accepted Answers:
Yes

5) Consider the graph shown in Problem 4. Does the graph have a 3-factor?

1 point

- Yes
 No

No, the answer is incorrect.
Score: 0

Accepted Answers:
Yes

6) Does every 4-regular simple graph have a perfect matching?

1 point

- Yes
 No

No, the answer is incorrect.
Score: 0

Accepted Answers:
No

7) Let G be a connected 3-regular graph. Each edge of G lies on some cycle. Let $S \subseteq V$, and C_1, C_2, \dots, C_m be the odd components of $G - S$. Let $e(C_i, S)$ denote the number of edges with one endpoint in C_i and other endpoint in S . Then $e(C_i, S)$ is

1 point

- odd
 even
 cannot say

No, the answer is incorrect.
Score: 0

Accepted Answers:
odd

8) Consider the graph in Problem 7. Then $\sum_{i=1}^m e(C_i, S)$

1 point

- less than m
 greater than or equal to $4m$
 greater than or equal to $3m$

No, the answer is incorrect.
Score: 0

Accepted Answers:
greater than or equal to $3m$