HOMEWORK

Graph Theory, MAD 3305, Summer A 2018

Textbook:

Graph Theory by Ronald Gould, Dover Publications, Inc. (2012)

Homework:

Chapter	Problem
1	1, 5, 6, 7 (for the first two only), 9, 10, 12, 14, 16, 18, 19, 20, 23, 24, 26, 27, 28
2	1, 2, 6, 7, 10, 21, 25, 26, 27, 28, 29, 30
3	1, 2, 3, 6, 9, 10, 13 (for the first two only), 15, 16 (a), 17, 18, 27, 28
4	1 (using the Ford and Fulkerson Algorithm only), 5, 9
5	1, 2, 4 (using the Algorithm 5.1.1 only), 10, 11, 13, 15, 16, 17, 18, 19 (order ≥ 4)
6	1, 5, 7, 8, 9, 10, 11, 14, 16
7	supplementary problems S.1, S.2, S.3
8	5, 6, 11, 27 and supplementary problems S.4, S.5, S.6, S.7, S.8

Supplementary problems are on next two pages.

Solutions:

The text has no answer key, but most of these have answers on Prof. Ramsamujh's site:
http://faculty.fiu.edu/∼ramsamuj/graphtheory/MAD_3305_index.html
It also contains many useful information. Thanks to Prof. Ram!

Supplementary Problems

S.1 Find men-optimal and women-optimal sets of stable marriages for the situation below.

There are 4 men (A, B, C and D) and 4 women (a, b, c and d). The left table shows the men's preferences and the right table shows the women's preferences.

MEN	1st	2nd	3rd	4th
A	b	c	a	d
B	b	d	c	a
C	c	d	a	b
D	a	c	d	b

WOMEN	1st	2nd	3rd	4th
a	A	D	C	B
b	C	D	B	A
c	D	B	A	C
d	B	A	D	C

S.2 Find a women-optimal set of stable marriages for the situation below.

There are 5 men (A, B, C, D and E) and 5 women (a, b, c, d and e). The left table shows the men's preferences and the right table shows the women's preferences.

MEN	1st	2nd	3rd	4th	5th
A	b	c	a	e	d
B	e	a	d	b	c
C	d	c	a	e	b
D	d	b	e	a	c
E	a	c	e	b	d

WOMEN	1st	2nd	3rd	4th	5th
a	D	B	A	C	E
b	B	C	A	E	D
c	C	D	B	A	E
d	D	B	A	E	C
e	B	D	A	E	C

S.3 Find men-optimal and women-optimal sets of stable marriages for the situation below.

There are 4 men (W, X, Y and Z) and 4 women (a, b, c and d). The left table shows the men's preferences and the right table shows the women's preferences.

MEN	1st	2nd	3rd	4th
W	a	c	d	b
X	d	a	b	c
Y	d	b	c	a
Z	b	d	c	a

WOMEN	1st	2nd	3rd	4th
a	Z	W	Y	X
b	W	Y	Z	X
c	Y	Z	X	W
d	Z	W	Y	X

Supplementary Problems

S.4 (a) Find $P(N_p, \lambda)$ where N_p is the graph with p vertices and no edges.

(b) Find $P(K_n - e, \lambda)$.

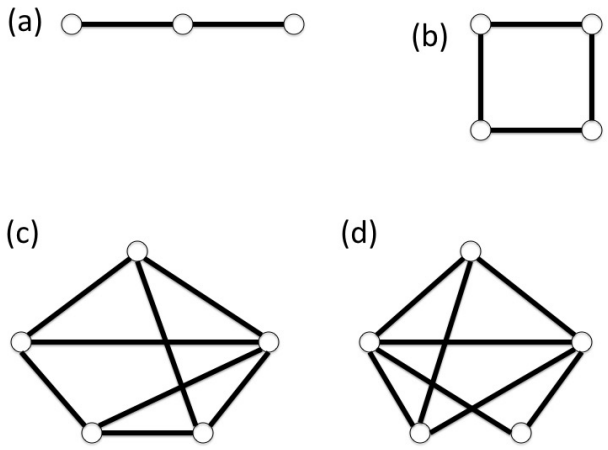
S.5 (a) Find $\chi(C_n)$ where C_n is the cycle with n vertices.

(b) Find $\chi(W_n)$ where W_n is the wheel with n vertices.

S.6 (a) Suppose G is a bipartite graph with at least one edge. Prove that $\chi(G) = 2$.

(b) If $\chi(G) = 2$, does it follow that G must be bipartite?

S.7 Find the chromatic number and chromatic polynomial of the following graphs.



S.8 Let G be a connected graph with n vertices. Prove that $P(G, \lambda) \leq \lambda(\lambda - 1)^{n-1}$.