

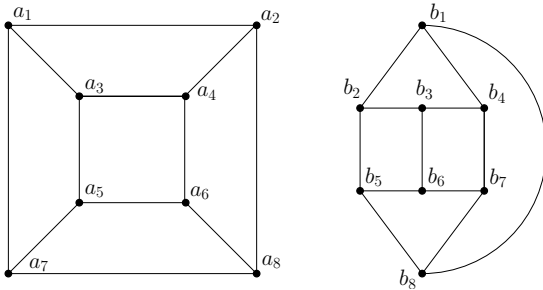
# M E T U

## Department of Mathematics

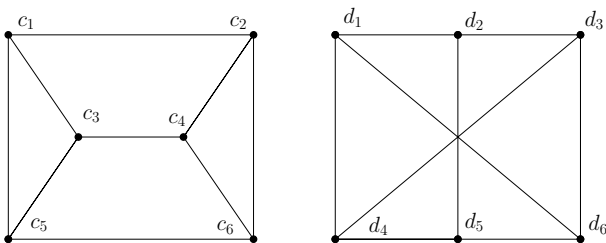
Discrete Mathematics						
Final						
Code : <i>Math 112</i>			Last Name :			
Acad. Year : <i>2010-2011</i>			Name :		Student No :	
Semester : <i>Spring</i>			Department :			
Instructor : <i>Bhupal, Küçüksakallı, Okutmuşur, Seven.</i>			Signature :			
Date : <i>01.06.2011</i>			<b>7 Questions on 4 Pages</b> <b>Total 80 Points</b>			
Time : <i>9.30</i>						
Duration : <i>120 minutes</i>						
1	2	3	4	5	6	7

**1. (6+6=12 pts.)** For each pair of graphs shown below, determine if they are isomorphic or not. Explain your answer.

**a)**



**b)**



**2. (10 pts.)** The probability that Ayşe hits a target is  $1/4$  and the probability that Bora hits the same target is  $1/8$ . If each fires once and the target is hit exactly once, what is the conditional probability that Bora hits the target?

**3. (12 pts.)** Solve the recurrence relation

$$a_n = -4a_{n-1} - 4a_{n-2}, \quad n \geq 2$$

with initial conditions  $a_0 = 1$  and  $a_1 = 2$ .

4. (6+6=12 pts.) In how many ways can 10 distinct books be distributed among 14 children if

a) no student gets more than one book?

b) five students get two books each?

5. (10 pts.) Let  $S = \{(x_i, y_i) : 1 \leq i \leq 5\}$  be a set of five points with integer coordinates in the  $xy$ -plane. Show that there is a pair of points in  $S$  such that the midpoint of the line connecting this pair has integer coordinates.

**6. (6+6=12 pts.)** For which values of  $m$  and  $n$ , the complete bipartite graph  $K_{m,n}$  has

a) an Euler circuit?

b) a Hamilton circuit?

**7. (6+6=12 pts.)** A planar graph  $G$  has 10 vertices each of degree 4.

a) How many edges does the graph  $G$  have?

b) How many regions are there in a planar representation of  $G$ ?