İTÜ BİLİŞİM ENSTİTÜSÜ
GRAPH THEORY AND APPLICATIONS   **November 20, 2009**
Midterm

1.a. Draw a graph of 8 nodes with 2 cut vertices.
b. Does your graph have any cut edge? Which ones?
c. What is the edge-connectivity of your graph?
d. What is the vertex-connectivity of your graph?

2. Explain with an example why Dijkstra's Algorithm doesn't work with graphs with negative edge weights?

3.a. How would you create different graphs of the same partition?
b. Draw 2 non-isomorphic graphs for the following partition.
5, 4, 3, 3, 2, 2, 1

4. Find all of the circuits of the undirected graph whose adjacency matrix given below, using fundemental circuits method.

	A	B	C	D	E	F
A	0	1	1	0	0	0
B	1	0	0	1	1	0
C	1	0	0	0	1	1
D	0	1	0	0	1	0
E	0	1	1	1	0	1
F	0	0	1	0	1	0

5. a. Is the graph in question 4 Eularian? Does it have an Euler trail? Why?
b. Is the graph in question 4 Hamiltonian? Why?

6. a. What is the thickness of $K_{3,5}$? Draw the planar subgraphs, whose union is $K_{3,5}$.
b. How would you determine the genus of a graph?
c. Is the graph in question 4 planar? If not, explain why. If yes, draw the planar representation of this graph.
d. How many planar representations of a planar graph can you draw?
e. What is the maximum number of edges for a simple, planar graph of 7 vertices? Why? Draw this graph.

Duration: 90 min.
Points: 1: 16pts, 2: 10pts, 3: 18pts, 4: 18pts, 5: 8pts, 6: (8+5+5+4+8)pts.