Name _____

MATH 350: Graph Theory and Combinatorics. Fall 2015.
Midterm Exam
Monday, October 19th, 2015, 9:35-10:25

The questions have to be answered in the booklets provided.

You can choose which two questions to answer. Indicate your choice on the front page. Only the two chosen questions will be graded.

Write your answers clearly. Justify all your answers.

You can consult your notes and textbooks. Use of calculators, computers, cell-phones, etc. is not permitted.

Problem	Your choice	Your score
1		
2		
3		
Total		

1. Let G be a simple graph such that $|V(G)| = 12$ and $\deg(v) = 6$ for every $v \in V(G)$.

a) Show that G is 2-connected.

b) Show that G contains an Eulerian tour.

c) Show that $\alpha(G) \leq 6$.

d) Show that $\nu(G) = 6$.

2. Let (G, w) be a weighted connected graph on n vertices such that $w(e)$ is a positive integer for every $e \in E(G)$. Let T be a min-cost spanning tree of (G, w), and suppose that $w(T) = \sum_{e \in E(T)} w(e) \geq n$. Show that there exists $u \in V(G)$ such that

$$\sum_{v \in V(G)} \text{dist}(u, v) \geq \frac{3}{2}(n-1).$$

3. Let G be a bipartite graph with a bipartition (A, B) such that $|A|, |B| \geq 10$. Suppose that $\deg(v) \geq 5$ for every $v \in V(G)$. Show that G contains a matching of size 10.