MIDTERM EXAM 2 (sample)

NAME(use CAPITAL letters, *first name first*):_____

NAME(sign):_____

ID#:_____

Instructions: Each of the 4 problems has equal worth. Read each question carefully and answer it in the space provided. YOU MUST SHOW ALL YOUR WORK TO RECEIVE FULL CREDIT. Clarity of your solutions may be a factor when determining credit. Calculators, books or notes are not allowed. Unless directed to do so, do *not* prove any theorem or proposition seen in class, and do not evaluate complicated expressions to give the result as a fraction or a decimal number. The proctor has been directed not to answer any interpretation questions.

Make sure that you have a total of 5 pages (including this one) with 4 problems.

1	
2	
3	
4	
TOTAL	

Before starting: Imagine that this is your exam and solve it in 50 minutes.

1. [25pts]. Two lottery systems are proposed for a new state lottery. In the first system, players select six different (integer) numbers from 1 to 50. In the second system, players select six numbers from 1 to 45, and may select any number as many times as they want. (In the second system, each ball selected in the lottery drawing is replaced before another ball is selected.) Which system has more possible tickets?

2. [25pts]. Let T be a tree such that every vertex adjacent to a leaf has degree at least 3. Prove that some pair of leaves in T has a common neighbor.

3. [25pts]. Show that if every edge of a graph G lies on an odd number of cycles, then G is Eulerian.

4. Determine whether the following statements are True or False. Justify your answer with a proof or a counterexample as appropriate.

(a) [8pts]. If every vertex of a connected graph G lies on at least one cycle, then G is 2-connected.

(b) [8pts]. There exists a graph containing an Eulerian trail and having exactly 1 vextex of odd degree.

(c) [9pts] The complement of the cycle C_6 is a planar graph.