299 SPRING 2009 **HOMEWORK 7**

Turn in your solution to at least two of the problems. **Explain your solution in full sentences. Give detailed reasonings.** Include diagrams and figures if appropriate.

Problem 1. Consider the regular hexagon $ABCDEF$. Let X be the midpoint of CD and Y be the midpoint of DE. Let Z be the common point of AX and BY. Which polygon has larger area ABZ or $DXZY$?

Problem 2. For what values of the parameters a and b has the equation $||x| + x - 4| = ax + b$ infinitely many solutions?

Problem 3. There are 16 chairs in a classroom. The chairs are empty. The students arrive one by one. The teacher tells them to sit on an empty chair and to send one of their neighbors, if there are any, out of the room. What is the maximum number of students that can sit down if

a. the chairs in a line;
b. the chairs are in a circle;
c. the chairs are in a 4×4 square grid?