MA 391 ASSIGNMENT # 3

Answers to problems may be handwritten.

(1) Show that the total number of wasted votes in a district is always equal to half of the voter turnout.

(2) Show that the Polsby-Popper score of a square with sidelength x does not depend on x. In other words, show that all squares have the same Polsby-Popper score.

(3) The figure below depicts a state consisting of 25 people, to be divided into 5 districts of population 5 each. Ten of the residents typically vote for the orange party, and fifteen typically vote for the purple party.

O	P	P	P	O
O	P	P	P	O
O	P	P	P	P
O	P	P	P	P
O	O	O	P	O

(a) Suppose you wanted to draw district lines in order to maximize the number of seats won by the purple party. How would you do it? How do you know that you can't secure more seats for the purple party?
(b) Suppose you wanted to draw district lines in order to maximize the number of seats won by the orange party. How would you do it? How do you know that you can't secure more seats for the orange party?
(c) Do either of the maps you drew seem fair? Why or why not?