MA 391 ASSIGNMENT # 2

Answers to problems may be handwritten.

(1) What is the minimum percentage of the popular vote needed to win the US presidential election? (Note: this question has a surprising answer because you're allowed to assume an extremely hypothetical case.)

(2) Suppose that the population of states A, B, and C are 54, 243, and 703, respectively, and 11 seats are to be apportioned. How would the seats be allocated according to the 4 methods: Hamilton's, Jefferson's, Adams', and Hill-Huntington.

- (3) The 1820 census had the US population at 8,969,878 and the population of New York at 1,368,775. The house had 213 seats.
 - (a) Using this data, calculate the standard divisor and New York's lower quota.
 - (b) In the 1822 apportionment, Jefferson's method was used with a modified divisor of 39,900. Find New York's modified quota and the number of seats New York was given. What do you notice?

- (4) An apportionment method is said to be *monotone* if, whenever state A receives fewer seats than state B, A has smaller population than B.
 - (a) Suppose that states A, B, C, and D have populations 3003, 400, 399, and 398, respectively, and there are 7 seats to be apportioned. Assuming an apportionment method that is monotone and satisfies the quota rule, find *all* possible apportionments. (In this problem, you do not know the method being used, so there is more than one possible apportionment.)
 - (b) Suppose that A gains 1 person, B gains 1103, C loses 3 people, and D loses 1. Again, find *all* possible apportionments.
 - (c) Expalin how this example demonstrates the population paradox.