

PROBLEM SET #2

Due Thursday, February 24 @ 11:59 pm
Submit as single pdf file to onCourse

Remember to review the [Guidelines for Problem Set](#) on the course webpage.

The six New England states (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont) are considering forming a Regional Legislature to address issues of common concern, such as the transportation infrastructure, converting the electric grid to renewable energy, ensuring a robust supply of maple syrup, etc.

However, the organizing group is having a difficult time negotiating the size of the Legislature. The only parameters they can agree upon are

- Each state should have at least three representatives in the Legislature.
- They will use the results from the 2020 U.S. census to determine the apportionment.

Use your expertise on apportionment to answer the following.

1. If they use Hill's method of apportionment, what is the smallest size Legislature that meets the criteria?

Hint: Use the "method of equal proportions" to compute the apportionment (this is the approach used by the Census Bureau).

What is the divisor x that you use for this apportionment?

2. Show that there is a size of the Legislature that meets the criteria where Hill's method and Webster's method disagree.

What is the divisor used for each method?

3. After much negotiation, they agree to a Legislature of size of 75 and to use Hamilton's method of apportionment.

- (a) Determine the apportionment.
- (b) Discourage them from using Hamilton's method by demonstrate that it is subject to the Population paradox in this case. That is, give specific growth rates for each state that demonstrate the Population paradox.