

Apportionment Homework

1. A small island nation has four islands. Each island deserved a portion of the 125 seats in the legislature proportional to its population. The following table gives each island's population as a percentage.

Island	A	B	C	D
Population	6.24%	28.48%	26.16%	39.12%

- (a) What is the standard quota for each island?
 - (b) What is the apportionment for each island according to Hamilton's method?
2. The state of Virginia has 2.57% of the United States population. A friend tells you that he calculated the number of seats Virginia would get in the U.S. House of Representatives if we still used Jefferson's method and got 10 seats. Explain why he cannot be correct. (Hint: what is Virginia's standard quota?)
 3. Suppose that a Hospital has 225 nurses working in four shifts (shift A in the morning, B in the afternoon, C in the evening, and D overnight). The average number of patients treated in each shift is shown in the table below.

Shift	A	B	C	D
Patients	450	610	830	360

- (a) What is the standard divisor?
 - (b) What is the standard quota for each shift? What does the standard quota represent? Explain.
 - (c) How should the nurses be apportioned using Hamilton's method?
 - (d) Will you need to adjust the standard divisor in order to get the correct apportionment using Webster's method? If so, will you need to increase or decrease the divisor? If not, explain why not.
4. Consider the formula for the standard quota,

$$q_i = \left(\frac{P_i}{P} \right) M.$$

- (a) Which variable(s) in the formula change in the Alabama paradox? Explain.
- (b) Which variable(s) in the formula change in the Population paradox? Explain.