Math 181 - Section X1
Midterm III
Review
Spring 2009

Chapter 14: Apportionment

Know the following terms: apportionment, population, standard divisor, house size, quota, critical divisor, geometric mean, Alabama paradox, population paradox, quota condition

The 4 apportionment methods we discussed are:

- Hamilton's method
  - Round all quotas down. If there remain any seats to give away, give them away in order, starting with the state whose quota has highest fractional part.
  - Advantages: Easy to use, satisfies the quota condition
  - Disadvantages: Alabama paradox and population paradox can occur.
- Jefferson's (divisor) method
  - Rounding method: round down
  - Critical divisor for state A with (current) apportionment n_A is $d_A = \frac{pop(A)}{n_A+1}$.
  - Advantages: Alabama paradox and population paradox **cannot** occur
  - Disadvantages: Does not always satisfy the quota condiiton, tends to favor big states
- Webster's (divisor) method
  - Rounding method: round down if fractional part is $< 1/2$ and round up if it is $\geq 1/2$.
  - Critical divisors for state A with (current) apportionment n_A are $d_A^- = \frac{pop(A)}{n_A-\frac{1}{2}}$ and $d_A^+ = \frac{pop(A)}{n_A+\frac{1}{2}}$.

- Advantages: Alabama paradox and population paradox **cannot** occur, does not really favor big or small states
- Disadvantages: Does not always satisfy the quota condiiton

- Hill-Huntington (divisor) method
  - Rounding method: given a quota between two integers n and $n+1$, round down if it is less than the geometric mean of n and $n+1$ and round up if it is at least the geometric mean of n and $n+1$.
  - Critical divisors for state A with (current) apportionment n_A are $d_A^- = \frac{pop(A)}{\sqrt{n_A(n_A-1)}}$ and $d_A^+ = \frac{pop(A)}{\sqrt{n_A(n_A+1)}}$.
  - Advantages: Alabama paradox and population paradox **cannot** occur
  - Disadvantages: Does not always satisfy the quota condiiton, tends to favor small states, more difficult to use (calculate)

Chapter 15: Game Theory

Know the following terms: minimax, maximin, saddlepoint, zero sum game, constant sum game, pure strategy, mixed strategy, expected winning or expected value, payoff matrix