
MATH 11008: Huntington-Hill Method

- The Hill-Huntington Method is the current method Congress uses to apportion the U.S. House of Representatives. This method was originally proposed in 1911 by Joseph Hill, the Chief Statistician of the Bureau of the Census, and later improved and refined by Edward Huntington, a Professor of Mechanics and Mathematics at Harvard University.
- It was passed in what became known as the 1941 Apportionment Act. This act had three key elements:
 1. It set the Huntington-Hill Method as the permanent method for apportionment of the House of Representatives.
 2. It made the decennial apportionments self-executing (once the official population figures are in, the apportionment formula is applied automatically and changes take effect without the need for congressional approval).
 3. It permanently fixed the size of the House of Representatives at 453 seats (with an exception made if a new state were to join the Union).
- The Huntington-Hill Method uses the geometric mean as its cutoff numbers.

Geometric Mean

The **geometric mean** of two positive numbers a and b is the number $G = \sqrt{a \cdot b}$.

Example 1: Determine the geometric mean for the following pairs of numbers. Round answers to three decimal places.

(a) 5 and 15

(b) 27 and 32

(c) 31 and 32

The Hill-Huntington Method

1. Find a “suitable” divisor D . (Here suitable divisor means a divisor that produces an apportionment of exactly M seats when the quotas are rounded using the Huntington-Hill rounding rule.)
2. Find the apportionment of each state by rounding its quota using the Huntington-Hill rounding rule. For a quota q , let L denote its lower quota, U its upper quota, and G the geometric mean of L and U .
 - If $q < G$, then round q down to L .
 - If $q \geq G$, then round q up to U .

Example 1: A small country consists of five states A, B, C, D and E with the populations listed in the following table. Use the Hill-Huntington Method to apportion the 40 seats in the legislature.

State	A	B	C	D	E	Total
Population	34,800	105,100	65,100	140,200	54,800	400,000

State	Population	Modified quota	Huntington-Hill cutoff	Huntington-Hill apportionment
A	34,800			
B	105,100			
C	65,100			
D	140,200			
E	54,800			
Total	400,000			