Math 325 Modeling
Divide yourselves into groups of two. I will assign each group one of the four apportionment methods described below. Your task is to prepare and present a five-minute argument that your method is the one we should use. You should give both mathematical and practical arguments that your method is superb and the other methods are terrible. (Feel free to bring up sordid episodes (real or imagined) in your opponents' pasts.) The handout listing the 1990 apportionments using some of these methods may be useful.

The house has $h$ seats. The population of state $i$ is $p_{i}$, so the exact number of seats to which state $i$ is entitled is $q_{i}=\frac{h p_{i}}{\sum p_{i}}$.

Hamilton method: Start by giving state $i\left\lfloor q_{i}\right\rfloor$ seats (i.e., round down). Divide the $k$ remaining seats up among the $k$ states with the largest fractional part $q_{i}-\left\lfloor q_{i}\right\rfloor$.
The next three methods all work in the following way: Begin by giving each state one seat. Then, once $n$ seats have been given out and state $i$ has received $a_{i, n}$ seats so far, give the ( $n+1$ ) st seat to the most deserving state, that is, the state with the lowest value of $f\left(a_{i, n}\right)$, where $f$ is as follows for the different methods:

Jefferson method: $f\left(a_{i, n}\right)=\frac{a_{i, n}+1}{q_{i}}$
Adams method: $f\left(a_{i, n}\right)=\frac{a_{i, n}}{q_{i}}$
Equal proportions method, a.k.a. Huntington-Hill method: $f\left(a_{i, n}\right)=\frac{\sqrt{a_{i, n}\left(a_{i, n}+1\right)}}{q_{i}}$
(This is the method that the U.S. currently uses. For your enjoyment, on the back of this sheet is a printout from the U.S. Census Bureau website explaining to the public how it works. Their description is different from this one - for fun, you can try to show that it's equivalent.)

