Your writeup of answers and discussion should be *typed*. Every question in a box should be answered fully in your write-up. Answers should be supported by the calculation, processes, or tools used to find them. Your presentation (both justification of your work and your followup discussion) should be in complete sentences. You may work with your fellow students and use any resources you like, but the words you use to describe your work must be your own. **If your answers are either a duplication of or duplicated by another student's answers, you will receive no credit for this assignment.**

1 The Scenario

Having become a citizen of the lovely idyllic nation of Aipotu, you're anxious to exercise your franchise and get involved in politics. There are three major political parties in the nation: the Peace Party, the Tranquility Party, and the Harmony Party; you've decided that Peace has the positions which you want to support and have gotten involved with them as a political operative. They're sending you information on their current, weakened political position, and they hope you can help improve their prospects. Preferably honestly, although they're up for skulduggery if you are.

2 The Big Leagues

Historically the Peace Party has done rather badly in the presidential election. The next one is a few years off, but the party bigwigs would like to be developing their campaign strategy now. Aitopu uses a rather unusual electoral system, but one the locals have gotten used to. They call it "transferable downvote", and it works as follows: every voter ranks the candidates, and then the candidate with the most last-place votes is removed from the ballot. Then the ballots are retabulated without that removed candidate, and the candidate with the most last-place votes is removed again. This process is repeated until only one candidate remains, who is declared the winner.

Records from the last presidential election are being used to predict the likely voter distribution on the next one. The ballot breakdown by percentage then was:

% of votes	24	9	18	2	11	36
First choice	P	P	T	T	H	H
Second choice	T	H	P	H	P	T
Third choice	H	T	H	P	T	P

> Just to make sure you understand this unfamiliar system, let's warm up by calculating which party won the last Aipotuan presidential election.

The Peace Party is already doing what they can to win support, and they don't think they'll be able to move these numbers much. But with a good argument, they might be able to sway the legislature to change the underlying system.

> Is there another system that favors the Peace Party and might result in their victory? Find one and build an argument which would be convincing to a neutral judge that this system is somehow more reflective of the will of the people or "just" than the current system is. Or, if there isn't one, give an explanation which might convince your party supervisor that it's impossible to fix the system.

Getting a voting system entirely uprooted is a long shot, so your party isn't putting much hope on that prospect and also wants backup plans.

Since 33% of the electorate supports your party, are there any useful messages to send to these voters which might help you win the election under the current system even if you can't change the minds of the other 67%? Explain what you could do, and how it might work.

3   All Politics is Local

The Peace Party is particularly strong in the state of Polyleritae; unfortunately their representation in the legislature is weak. Aipotu is divided into six states, and apportions members in their 60-person legislative body using the d'Hondt method (better known in America as the Jefferson method). As of the last census, these were the populations of the six states.

State	Population
Nephelogia	731,000
Hytholdes	414,000
Alaopolita	361,000
Achoria	268,000
Polyleritae	159,000
Zapolete	67,000

To get a feel for why this is a problem for the Peace Party, the state party chair suggests you work out what the current apportionments are and in particular how Polyleritae's representation compares against the representation of the other states.

The party would like to slip some new language into the upcoming Apportionment Act to redress the lack of representation particularly in this state. They want you to come up with a plan, and a good argument for it.

Describe an apportionment plan to be suggested to the legislature; you can vary the underlying method and even the number of representatives, but try to achieve two goals: first, get proportional, or if possible better-than-proportional representation for Polyleritae; and second, have some argument for why this plan is more just or more equitable than what is currently out there. Your argument needs to be convincing to people other than the Polylerites, so make sure your argument is more than just the unfairness to them in particular.

4   Bringing Down the House

The governor of the state of Achoria is a stalwart of the Tranquility Party, and has rigged the state legislature to support Tranquility over Peace (the Harmony Party has no adherents in Achoria). There are eight legislative districts of equal population in Achoria, and the distribution of registered voters with each individual party is somewhat lopsided.

District	Peace voters	Tranquility voters
LD-1	13,400	20,100
LD-2	12,100	21,400
LD-3	14,600	18,900
LD-4	31,000	2,500
LD-5	15,900	17,600
LD-6	11,600	21,900
LD-7	14,100	19,400
LD-8	12,300	21,200
Total	125,000	143,000

Historically, the Peace Party has won easily in Legislative District 4, and has sometimes clawed their way to victory in LD-5, but the Tranquility Party has controlled the other 6 seats, despite a largely split populace. The Aipotuans have watched American judicial proceedings pretty closely, and they think this new "efficiency gap" measurement might help them out in building a good judicial argument.

Nobody in Aitopu knows quite how the efficiency gap works, so they dug up what seems like a simple worked example (hotlink to the example, courtesy of the Brennan Center). They'd like to know what this would show them if applied to their own state of Achoria, and have asked you to work up the numbers.

Armed with the notion of the efficiency gap, propose a fair, or very nearly fair, way of splitting Achoria's 125,000 Peace voters and 143,000 Tranquility voters into eight equal-population legislative districts, preferably one which is likely to elect a good number of Peace candidates. Don't worry about the underlying geography; assume you can distribute individual voters among the districts freely as long as each district has the same number of people.

Bonus: As an intellectual exercise ("it'll never get past the judiciary," your supervisor assures you), determine a districting which would give the Peace Party control of as many legislative districts as possible. You don't have to worry about the efficiency gap and can be as unfair as you want, as long as all the districts have the same population. Also, determine the efficiency gap in your new unfair distribution.