$\qquad$
Score: $\qquad$ / 70 points Not due ever

1. (30 points) A high school has 234 freshmen, 312 sophomores, 258 juniors, and 230 seniors who should be represented on the ten-person student council.
(a) (4 points) Identify the states, their populations, the total population, and the house size, in the previous problem.
(b) (3 points) Calculate the standard divisor.
(c) (5 points) Apportion seats using the Hamilton method.
(d) (6 points) Use Jefferson rounding to complete the following table. Should I choose a new divisor to reach a fair apportionment? If I need a new divisor, should it be larger or smaller than 102 ?

| Year | \# Students | Standard Divisor |  | Divisor = 102 |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Exact | Round | Exact | Round |
| Freshmen | 234 |  |  |  |  |
| Sophomore | 312 |  |  |  |  |
| Junior | 258 |  |  |  |  |
| Senior | 230 |  |  |  |  |

(e) (6 points) Use Weber rounding to complete the following table. Should I choose a new divisor to reach a fair apportionment? If I need a new divisor, should it be larger or smaller than 102 ?

| Year | \# Students | Standard Divisor |  | Divisor = 102 |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Exact | Round | Exact | Round |
| Freshmen | 234 |  |  |  |  |
| Sophomore | 312 |  |  |  |  |
| Junior | 258 |  |  |  |  |
| Senior | 230 |  |  |  |  |

(f) (6 points) Use Hill-Huntington rounding to complete the following table. Should I choose a new divisor to reach a fair apportionment? If I need a new divisor, should it be larger smaller than 102 ?

| Year | \# Students | Standard Divisor |  | Divisor $=102$ |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Exact | Round | Exact | Round |
| Freshmen | 234 |  |  |  |  |
| Sophomore | 312 |  |  |  |  |
| Junior | 258 |  |  |  |  |
| Senior | 230 |  |  |  |  |

2. (20 points) The math department has the capacity to run 54 class sections this semester, and there are 1024 students taking precalculus, 815 in Calculus 1, 676 in Calculus 2, 314 in Calculus 3, 64 in abstract algebra 1, and 8 in abstract algebra 2.
(a) (5 points) Department policy states that any class with interested students must run. Which divisor method would ensure this policy is met?
(b) (5 points) Determine each course's quota.
(c) (10 points) Use the divisor method from part (a) to decide how many sections of each class should be run.
3. (20 points) Come up with something from your life you must divide among many parties. Phrase it as an apportionment problem, estimate populations and house sizes, and find a fair apportionment based on your setup.
