MGF 1107 **PROBLEM SET 9**

1a. What is 60 divided by 4?

1b. What is 60 divided by 3?

Notice that when the divisor (the number we are dividing by) gets smaller, the quotient (the answer to the division problem) gets bigger. Also, when the divisor gets bigger, the quotient gets smaller.

2. A small country has 3 states. We are apportioning 12 seats using Jefferson's method. The standard divisor of 886.83 yields the following quotas:

State	Quotas	Lower Quotas
North	6.258	6
Central	3.501	3
South	2.241	2
Total		**11**

a) So we are one seat shy of what we need. We need the quotas to be a bit larger so that one of them, when rounded down, is one larger than before. To achieve this goal, we are now going to replace the standard divisor with a modified divisor. To make the quotas bigger, do we divide by a modified divisor bigger or smaller than 886.83?

b) If we use d = 750 for the modified divisor, we see that we made it too small.

State	Quotas	Lower Quotas	Modified Quotas	Lower Modified Quotas
North	6.258	6	7.400	7
Central	3.501	3	4.140	4
South	2.241	2	2.649	2
Total		**11**		**13**

What would be a good guess for our second modified divisor?

3. You are using the Hill-Huntington method to apportion the 435 seats in the House of Representatives.
You have tried the following modified divisors with the following results:

Divisor	Seats
300,000	434
260,000	438

a) What would be a good guess for the next modified divisor?

b) What would be a good guess for the next modified divisor if you were shooting for a total of 437 seats?

4. You are using Webster's method to apportion the 435 seats in the House of Representatives. You have tried the following modified divisors with the following results:

Divisor	Seats
300,000	434
290,000	439

a) What would be a good guess for the next modified divisor?

b) What would be a good guess for the next modified divisor if you were shooting for a total of 437 seats?

5. Which are the only two apportionment methods where it is possible that the standard divisor produces the desired number of seats and no trial-and-error is needed?

6. Which is the only apportionment method where we *never* use trial-and-error to find a modified divisor?

7. Suppose your quota is 4.98. Round the quota using:
a) Jefferson's method

b) Adams' method

c) Webster's method

d) the Hill-Huntington method

8. If you are using the Hill-Huntington method, is it possible to have a rounded quota of 0?

9. A state has a population of 1000 and the standard divisor is 100.
a) What is this state's quota?

b) Using Jefferson's method, what is its lower quota?

c) Using Adams' method, what is its upper quota?

d) Using Webster's method, what is its rounded quota?