4.4 Adam's and Webster's Method

Adam's method was first proposed by John Quincy Adams in 1832 as a counterpoint to Jefferson's method. The method works like Jefferson's using a modified divisor but we round the modified quotas *up*, the states get their upper quota. This means we need the modified quotas to be *smaller* than the standard quota so our modified divisor d shall be larger.

Example 7 pg. 127 The Congress of Parador. Using Adam's method:

State	**Population**	**d=50,500 Modified U**	**d=50,700 Modified U**
A	1,646,000	33	33
B	6,936,000	138	137
C	154,000	4	4
D	2,091,000	42	42
E	685,000	14	14
F	988,000	20	20
Total	12,5000,000	**251**	**250**

Like with Jefferson's method in Adam's method the main issue is to find the modified divisor that'll work. Here are the steps to the method, observe that the first step might take a little while, but pretty much takes care of the next two steps anyway...

Steps to Adam's Method

1. Find a suitable divisor d
2. Use d (as opposed to the standard divisor) to compute the modified quotas.
3. Each state is apportioned its modified upper quota.

Webster's Method

Again, in this method, we will find a modified divisor, but instead of rounding all quotas down (Jefferson's method) or rounding all quotas up (Adam's method), we will do conventional rounding. Note that when rounding all quotas down their sum for sure doesn't reach the value of M (hence we seek a slightly smaller divisor, to make quotas bigger), and similarly when we round all quotas up their sum exceeds M (hence we seek a slightly bigger divisor). But with conventional rounding it could sometimes happen that the actual standard divisor SD works out (not often but we still use it as our first guess).

If the sum of the rounded quotas goes over the value of M, then we need reduce the quotas, that is, seek for a divisor d greater than SD.

Conversely if the sum of the rounded quotas falls below M, then we need to increase the quotas, that is, seek for a divisor d smaller than SD.

Example 8 pg. 128 The Congress of Parador. Using Webster's method: (Populations in *thousands*).

State	**Pop.**	**1st guess: q**	**d=50,000 Round. q**	**2nd guess: Mod. q**	**d=50,100 Round. q**
A	1,646	32.92	33	32.85	33
B	6,936	138.72	139	138.44	138
C	154	3.08	3	3.07	3
D	2,091	41.82	42	41.74	42
E	685	13.70	14	13.67	14
F	988	19.76	20	19.72	20
Total	12,5000		**251**		**250**

Examples

1. (Placerville Hospital example from 4.1) Recall in this example we need to apportion 225 nurses among 4 shifts proportionally to the number of patients in each shift. Apportion using both Adam's and Webster's method.

Shift	A	B	C	D	**Total**
Patients	871	1029	610	190	2,700
Standard q	72.58	85.75	50.83	15.83	
U	73	86	51	16	
Modified U					
Rounded q					
Mod. rounded q					
Mod. rounded q					
Mod. rounded q					

2. (Exercise 32) Tasmania State University is made up of five different schools: Agriculture, Business, Education, Humanities, and Science (A, B, E, H and S for short). The enrollments and standard quotas of each school are shown below. Apportion the positions according to Both Adam's and Webster's method method.

School	A	B	E	H	S	**Total**
Enrollents	1,646	762	2,081	1,066	6,945	12,500
Standard q	32.92	15.24	41.62	21.32	138.90	250
U quota						
Modified U						
Modified U						
Modified U						
Rounded q						
Mod. rounded q						