

# MAT 100 Homework #9 Key

1. a. 710,000

b. The # of people represented by each Congressional seat (avg)

c. 53.597      LQ = 53      UQ = 54

d. 16.53      LQ = 16      UQ = 17

e. 0.811      LQ = 0      UQ = 1      ← can't get less than 1

Subject	Pop	SQ	LQ	UQ	Extra	Final App
Pre-College Alg	5017	287.738	287	287	+1	288
College Alg	763	43.760	43	43	+1	44
Trig	408	23.3998	23	23		23
Calculus	656	37.623	37	37	+1	38
Stats	1002	57.467	57	57		57
	<u>7846</u>			<u>447</u>		<u>450 sections</u>

Hamilton's above

$\frac{7846}{450} = 17.436$  Students per section

d. UQ 288, 44, 24, 38, 58

e. Modified Divisor = 17.33

MQ's 289.5, 44.028, 23.543, 37.853, 57.819

round down for Apportionment:  $289 + 44 + 23 + 37 + 58 = 450$

→ quota violation

f. Webster's → Round normally gives same result as Hamilton's

	Pop	SQ	LQ	UQ	Geom Mean	Final App
Pre-Coll Alg	5017	287.738	287	288	287.49856	288
Coll. Alg	763	43.76	43	44	43.497..	44
Trig	408	23.40	23	24	23.49468	23
Calc	656	37.62	37	38	37.4966665	38
Stats	1002	57.47	57	58	57.4978	57
	<u>7846</u>					



3.

Subjects	Pop	SQ	WQ	LQ		Hamilton's	Geom Mean	HH
Pre Coll Alg	5017	12.788	13	12	+	13	12.48996	13
Coll Alg	763	1.9449	2	1	+	2	1.41	2
Trig	408	1.040	2	1		1	1.41	1
Calculus	656	1.672	2	1	+	2	1.41	2
Stats	1002	2.554	3	2		2	2.449	3
								<u>21</u>

$\frac{7876}{20} = 392.3$  # of students per tutor  
 need modified divisor

Subject	SQ	MQ=405	HH	MQ=401	Webster's	MQ=355	Jefferson's
PCA	12.788	12.388	12	12.511	13	14.132	14
CA	1.9449	1.884	2	1.9027	2	2.1493	2
Trig	1.040	1.0074	1	1.0175	1	1.1493	1
Calc	1.672	1.6198	2	1.6359	2	1.8479	2
Stats	2.554	2.474	3	2.4988	2	2.8225	<u>20 e.</u>
			<u>20 g.</u>			<u>20 f.</u>	

4.

State	Pop	SQ	IApp	Hamilton's
K	88,129	54.467	54	54
H	79,340	49.035	49	49
C	89,920	55.574	55 +	56
S	54,543	33.710	33 +	34
P	27,881	17.232	17	17
			<u>208</u>	<u>210</u>
	$\frac{339,813}{210} = 1618.157$			



5.

State	Pop	SQ	MQ=82.5	Jefferson's	MQ=93	Adams
C	965	10.95	11.697	11	10.376	11
N	219	2.485	2.654	2	2.35	3
H	519	5.889	6.29	6	5.58	6
K	828	9.395	16.036	10	8.90	9
S	906	10.281	10.982	10	9.74	10
	<u>3437</u>	<u>36</u>		<u>39</u>		<u>39</u>

$\frac{3437}{39} = 88.128$

6. above

N & K exchanged a seat

7.

State	Pop	SQ	IApp
V	3457	8.62	9
Pallas	9740	24.28	24
Pens.	8248	20.56	21
C.	6913	17.23	17
E	1734	4.32	4
	<u>30,092</u>		<u>75</u>

$\frac{30,092}{75} = 401.23$

← Webster's

8.

State	Pop	SQ	Geom Mean	H#
A	3411	22.74	22.494	23
B	2421	16.14	16.492	16
C	11586	77.24	77.498	77
D	4494	29.96	29.4957	30
E	3126	20.84	20.4939	21
F	4962	33.08	33.496	33
				<u>200</u>

$30,000/200 = 150$

← H# apportionment



9. Alabama Paradox

10. population paradox

11. No state may be awarded more than their upper quota or less than their lower quota

12. Alabama and population are illustrated above

# of seats change

higher growth rate loses a seat

New States paradox - addition of new state changes apportionment of other states

13. This theorem says no apportionment method can satisfy the quota rule and also avoid all paradoxes.

14. Gerrymandering adjusts the boundaries of congressional districts to benefit the party in power

15. attached

16. a. population paradox

b. Alabama paradox

c. Alabama paradox

d. New States paradox

e. population paradox



#15 Hamilton

	Seats	SD	4,725.00																	
	80	SD	4,725.00																	
State	Therix A	Nellis B	Koreira C	Hunter D	Geary E	Bastok F	Arroyo G	Evans H	Total											
Population	4,000	19,000	35,000	74,000	87,000	72,000	2,000	85,000	378,000											
Upper Quota	1	5	8	16	19	16	1	18	84											
Standard Quota	0.84656	4.02116	7.40741	15.66138	18.41270	15.23810	0.42328	17.98942	80.00000											
Lower Quota	-	4	7	15	18	15	-	17	76											
Hamilton																				
Lower Quota	-	4	7	15	18	15	-	17	80											
Surplus	1	-	-	1	-	-	1	1												
Final Quota	1	4	7	16	18	15	1	18	80											

#15 Jefferson's

	Seats	SD	4725.000	D	4600															
	80	SD	4725.000	D	4600															
State	A	B	C	D	E	F	G	Total												
Population	4,000	19,000	35,000	74,000	87,000	72,000	2,000	378,000												
Upper Quota	1	5	8	16	19	16	1	84												
Standard Quota	0.84656	4.02116	7.40741	15.66138	18.41270	15.23810	0.42328	80.00000												
Lower Quota	-	4	7	15	18	15	-	76												
Jefferson																				
Revised Quota	0.86957	4.13043	7.60870	16.08696	18.91304	15.65217	0.43478	80												
Final Quota	1	4	7	16	18	15	1	80												

Jefferson

Remember

Clear Area

#15 Adams

Seats	80	SD	4725	D	4950
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State	A	B	C	D	E	F	G	H	Total
Population	4,000	19,000	35,000	74,000	87,000	72,000	2,000	85,000	378,000
Upper Quota	1	5	8	16	19	16	1	18	84
Standard Quota	0.84656	4.02116	7.40741	15.66138	18.41270	15.23810	0.42328	17.98942	80.0000
Lower Quota	-	4	7	15	18	15	-	17	76
Adams Revised Quota	0.80808	3.83838	7.07071	14.94949	17.57576	14.54545	0.40404	17.17172	80
Adams Final Quota	1	4	8	15	18	15	1	18	80

#15 Webster's

Seats	80	SD	4725	D	4,725.00
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State	A	B	C	D	E	F	G	H	Total
Population	4,000	19,000	35,000	74,000	87,000	72,000	2,000	85,000	378,000
Upper Quota	1	5	8	16	19	16	1	18	84
Standard Quota	0.84656	4.02116	7.40741	15.66138	18.41270	15.23810	0.42328	17.98942	80.0000
Lower Quota	-	4	7	15	18	15	-	17	76
Webster Revised Quota	0.84656	4.02116	7.40741	15.66138	18.41270	15.23810	0.42328	17.98942	80
Webster Final Quota	1	4	7	16	18	15	1	18	80

Webster

Remember

Clear Area

#15 Huntington-Hill

Seats	80	SD	4725	D	4,725.00
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State	A	B	C	D	E	F	G	H	Total
Population	4,000	19,000	35,000	74,000	87,000	72,000	2,000	85,000	378,000
Upper Quota	1	5	8	16	19	16	1	18	84
Standard Quota	0.84656	4.02116	7.40741	15.66138	18.41270	15.23810	0.42328	17.98942	80.00000
Lower Quota	-	4	7	15	18	15	-	17	76
<b>Huntington-Hill</b>									
Revised Quota	0.84656	4.02116	7.40741	15.66138	18.41270	15.23810	0.42328	17.98942	
Final Quota	1	4	7	16	18	15	1	18	80
<input type="button" value="Huntington-Hill"/> <input type="button" value="Remember"/> <input type="button" value="Clear Area"/>									

