Math 1116 Homework #5 key

1. a. $\frac{308,850,000}{435} = 710,000$ b) # of people represented by each seat in the House.

c) $\frac{38,054,000}{710,000} = 53.597 = SQ$ $LQ = 53$, $UQ = 54$

d) $\frac{11,737,000}{710,000} = 16.531 = SQ$ $LQ = 16$ $UQ = 17$

e) $\frac{576,000}{710,000} = .811 = SQ$ $LQ = 0$ $UQ = 1$

2.

Class	Pop/Students	SQ	LQ	UQ	Final d) Hamilton's
P-C Alg	5017	287.672	287 +1	288	288
Col Alg	763	43.75	43 +1	44	44
Trig	408	23.394	23	24	23
Calc	656	37.615	37 +1	38	38
Stats	1002	57.454	57	58	57
total:	7846		447		450

3 leftover

a) SD: $\frac{7846}{450} = 17.44$

b) approximately 17 students per section (average)

e) Webster's method needs no change. All sections that rounded up under Standard divisor were awarded seats and no others.

2 cont'd.

Jefferson's Method

class	Population	MQ	L(MQ)
PC Alg	5017	289.497	289
Col Alg	763	44.028	44
Trig	408	23.543	23
Calc	656	37.853	37
Stats	1002	57.819	57
	7846		450

Standard divisor was 17.44

modified divisor should be approx. 17.33

3.

class	Population	SQ	LQ	UQ	d) Final Hamilton's
P-C Alg	5017	12.789	12+1	13	13
Col Alg	763	1.945	1+1	2	2
Trig	408	1.040	1	2	1
Calc	656	1.672	1+1	2	2
Stats	1002	2.554	2	3	2
	7846		17		17

a) SD: $\frac{7846}{20} = 392.3$

b) represents # of students serviced by each tutor (not all students need tutors, so while this seems like a lot its not necessarily a bad figure)

f)

class	Pop	MQ (401) Webster's
P-C Alg	5017	12.511 → 13
Col Alg	763	1.903 → 2
Trig	408	1.017 → 1
Calc	656	1.636 → 2
Stats	1002	2.498 → 2
	7846	20

e)

MQ (350) Jefferson's	
14.334 →	14
2.18 →	2
1.166 →	1
1.874 →	1
2.862 →	2
	20

Huntington-Hill's Method for #2, 3.

2.

Class	Pop.	SQ	LQ	UQ	$\sqrt{LQ*UQ}$	Apportionment
Pre-C Alg	5017	287.672	287	288	287.4995	288
Col Alg	763	43.75	43	44	43.4971	44
Trig	408	23.394	23	24	23.49468	23
Calc	656	37.615	37	38	37.49660...	38
Stats	1002	57.454	57	58	57.4978	57
	7846					450

SD = 17.44

3.

Class	Pop	SQ	LQ	UQ	$\sqrt{LQ*UQ}$	
Pre-C Alg	5017	12.789	12	13	12.4899..	13
Col Alg	763	1.945	1	2	1.4142..	2
Trig	408	1.040	1	2	1.4142...	1
Calc	656	1.672	1	2	1.4142...	2
Stats	1002	2.554	2	3	2.4494...	3
	7846					21 too many

SD = 292.3

MD = 405

Class	Pop	MQ	LQ	UQ	$\sqrt{LQ*UQ}$	
Pre-C Alg	5017	12.387	12	13	12.4899...	12
Col Alg	763	1.88395	1	2	1.4142...	2
Trig	408	1.0074	1	2	1.4142...	1
Calc	656	1.61975	1	2	1.4142...	2
Stats	1002	2.474	2	3	2.4494	3
	7846					20

4.

State	Pop	SQ	LQ	UQ	$\sqrt{LQ*UQ}$	
A	3411	22.74	22	23	22.494	23
B	2421	16.14	16	17	16.4924...	16
C	11,586	77.24	77	78	77.498...	77
D	4494	29.96	29	30	29.4957	30
E	3126	20.84	20	21	20.4939	21
F	4962	33.08	33	34	33.496	33
	30,000					200

Seats = 200

SD = 150

answers may vary depending on method chosen

5. Alabama Paradox

6. Population Paradox

7.

#6 from text

Shift	Pop	SQ	Hamilton	Jefferson MQ		Webster's MQ		Huntington Hill MQ	$\sqrt{LQ*UQ}$	
A	15,262	4.209	4	4.437	4	4.3274	4	4.239	4.47	4
B	37,017	10.209	10	10.761	10	10.486	10	10.28	10.488	10
C	37883	10.448	+1 11	11.013	11	10.732	11	4.523	10.488	11
D	36.743	10.1336	10	10.681	10	10,409	10	10.206	10.488	10
	126,905		35		35		35			35

Seats = 35

SD = 3625.857

MD = 3440 MD = 3530 MD = 3600

all apportioned the same way

#11

Shift	Pop	SQ	Hamilton MQ	Jefferson MQ	Webster's MQ	Huntington-Hill MQ	$\sqrt{LQ*UQ}$	
Mom	95	1.4074	1 1.532	1 1.496	1	1.4136	1.4142	1
Mid	305	4.5185	5 4.91	4 4.512	5	4.538	4.472	5
After	435	6.444	6 7.016	7 6.43	6	6.473	6.481	6
Even	515	7.6296	8 8.306	8 7.618	8	7.663	7.4833	8
	1350		20	20	20			20

SD = 67.5 MD = 62 MD = 67.6 MD = 67.2

7 cont'd

#12

Shift	Pop	Hamilton SQ		Jefferson MQ		Webster's MQ		Huntington-Hill MQ	JLKU	
Morn	95	1.759	2	1.9	1	1.727	2	1.727	1.4142	2
Mid	305	5.648	6	6.1	6	5.545	6	5.545	5.477	6
After	435	8.0556	8	8.7	8	7.909	8	7.909	7.483	8
Even	515	9.537	9	10.3	10	9.3636	9	9.364	9.4868	9
	1350		25		25		25			25

SD = 54
Seats = 25

MD=50 MD=55 MD=55

#22

City	Pop	SQ	Apportionment
Reynoldsburg	10,450	1045	10
E. Colum.	89 550	89.55	90
	100,000		100

Seats = 100
SD = 1000

City	Pop	SQ	Apportionment
Reynoldsburg	10,450	10,425	11
E. Colum.	89,550	89,337	89
Gahanna	5,250	5:238	5
	105,250		105

Seats = 105
SD = 1002.38

This is an example of New states paradox

Summary = in #6 all apportionments are the same
in #11 Jefferson's is different than the others.
in #12 even though 5 new employees were added, Jefferson's awarded none to the morning shift.
#22 New States paradox