**MAT 118 Fall 2013, Chapter 4 Sample Exam, Apportionment**
**Actual test is on Monday Oct 21, 2013 (changed from original schedule)**

(1) ☐ Whose method is currently used to apportion seats in the United States House of Representatives?
**(a)** Hamilton
**(b)** Huntington-Hill
**(c)** Jefferson
**(d)** Webster
**(e)** Adams

(2) ☐ The exact fractional number of seats a state would receive, if fractional seats were allowed, is called the
**(a)** standard divisor
**(b)** upper quota
**(c)** lower quota
**(d)** fractional divisor
**(e)** standard quota

(3) ☐ Under Hamilton's method a state can lose seats when its population goes up, even if there are no other changes. In the text this is called the
**(a)** Alabama paradox
**(b)** Maine paradox
**(c)** Population paradox
**(d)** Hamilton's paradox
**(e)** The growth paradox

(4) ☐ Whose method is this:
(1) Choose a divisor $D$ so the lower quotas sum to the number of seats
(2) Give each state is given its modified lower quota.
**(a)** Adams
**(b)** Hamilton
**(c)** Jefferson
**(d)** Webster
**(e)** Huntington-Hill

(5) ☐ Whose method satisfies the quota rule, but can give rise to paradoxs such as the Alabama paradox?
**(a)** Adams
**(b)** Hamilton
**(c)** Jefferson
**(d)** Webster
**(e)** Huntington-Hill

**The following problems use the chart on the last page.**

(6) ☐ What divisor (in millions) do we choose to use Webster's method to apportion 131 seats?
**(a)** 1.04 **(b)** 1.08 **(c)** 1.10 **(d)** 1.11 **(e)** 1.18

(7) ☐ Suppose you want to use Jefferson's method to apportion 128 seats. The divisor you need to use is
**(a)** 1.00
**(b)** 1.07
**(c)** 1.08
**(d)** between 1.04 and 1.05
**(e)** between 1.11 and 1.12

(8) ☐ If we apportion 135 seats then state E gets
**(a)** more seats using Adams' method than by either Jefferson or Webster
**(b)** more seats using Jefferson's method than by either Adams or Webster
**(c)** more seats using Webster's method than by either Jefferson or Adams
**(d)** gets equally many seats from Jefferson and Webster and fewer from Adams
**(f)** gets the same number of seats from all three methods

(9) ☐ Using Jefferson's method with 126 seats, how many seats does state C get?
**(a)** 20 **(b)** 21 **(c)** 22 **(d)** 23 **(e)** 24 **(f)** 25

(10) ☐ If Webster's method is applied to apportion 124 seats between the states, the number of seats states A,B,C,D,E receive is
**(a)** 9, 28, 23, 21, 43
**(b)** 9, 28, 23, 22, 43
**(c)** 8, 28, 23, 21, 42
**(d)** 9, 29, 23, 22, 43
**(e)** 9, 28, 23, 22, 43

(11) ☐ Using Adam's method, if we increase the number of seats from 131 to 132, which state gets the extra seat?
**(a)** A **(b)** B **(c)** C **(d)** D **(e)** E

Suppose a country has five states called A,B,C,D,E with populations 10,33,27,25,50 million respectively. Below is a table of these populations divided by various divisors. The first row gives the standard quotas. The remaining rows give modified divisors. The first column in each row is the modified divisor in millions. The next five columns show the state populations divided by this divisor. Thee last three columns are the sums of the lower quota, rounded quota (using the usual .5 rounding) and upper quota respectively.

| Divisor | A | B | C | D | E | Jeff. | Web. | Adams |
|---|---|---|---|---|---|---|---|---|
| 1.00 | 10.00 | 33.00 | 27.00 | 25.00 | 50.00 | 145 | 145 | 145 |
| 1.01 | 9.90 | 32.67 | 26.73 | 24.75 | 49.50 | 140 | 145 | 145 |
| 1.02 | 9.80 | 32.35 | 26.47 | 24.51 | 49.02 | 140 | 142 | 145 |
| 1.03 | 9.70 | 32.04 | 26.21 | 24.27 | 48.54 | 139 | 141 | 144 |
| 1.04 | 9.61 | 31.73 | 25.96 | 24.04 | 48.08 | 137 | 140 | 142 |
| 1.05 | 9.52 | 31.43 | 25.71 | 23.81 | 47.62 | 135 | 139 | 140 |
| 1.06 | 9.43 | 31.13 | 25.47 | 23.58 | 47.17 | 135 | 136 | 140 |
| 1.07 | 9.34 | 30.84 | 25.23 | 23.36 | 46.73 | 133 | 135 | 138 |
| 1.08 | 9.25 | 30.56 | 25.00 | 23.15 | 46.30 | 133 | 134 | 137 |
| 1.09 | 9.17 | 30.28 | 24.77 | 22.94 | 45.87 | 130 | 133 | 135 |
| 1.10 | 9.09 | 30.00 | 24.55 | 22.73 | 45.45 | 130 | 132 | 134 |
| 1.11 | 9.00 | 29.73 | 24.32 | 22.52 | 45.05 | 129 | 131 | 134 |
| 1.12 | 8.92 | 29.46 | 24.11 | 22.32 | 44.64 | 127 | 129 | 132 |
| 1.13 | 8.85 | 29.20 | 23.89 | 22.12 | 44.25 | 126 | 128 | 131 |
| 1.14 | 8.77 | 28.95 | 23.68 | 21.93 | 43.86 | 123 | 128 | 128 |
| 1.15 | 8.69 | 28.70 | 23.48 | 21.74 | 43.48 | 123 | 126 | 128 |
| 1.16 | 8.62 | 28.45 | 23.28 | 21.55 | 43.10 | 123 | 125 | 128 |
| 1.17 | 8.54 | 28.21 | 23.08 | 21.37 | 42.74 | 122 | 124 | 127 |
| 1.18 | 8.47 | 27.97 | 22.88 | 21.19 | 42.37 | 120 | 122 | 125 |
| 1.19 | 8.40 | 27.73 | 22.69 | 21.01 | 42.02 | 120 | 122 | 125 |
| 1.20 | 8.33 | 27.50 | 22.50 | 20.83 | 41.67 | 118 | 121 | 123 |