Stat 257.01 Fall 2004
Stratified Random Sampling

An advertising firm, interested in determining how much to emphasize television advertising in a certain county, decides to conduct a sample survey to estimate the average number of hours each week that households within the county watch television. The county contains two towns, A and B, and a rural area. Town A is built around a factory, and most households contain factory workers with school-aged children. Town B is an exclusive suburb of a city in a neighbouring county and contains older residents with few children at home. There are 155 households in town A, 62 in town B, and 93 in the rural area.

(a) Discuss the merits of using stratified random sampling in this situation.

Suppose that the advertising firm has enough money to interview $n = 40$ households and decides to select random samples of size $n_1 = 20$ from town A, $n_2 = 8$ from town B, and $n_3 = 12$ from the rural area. The SRS are selected and the interviews are conducted. The results are shown in the following table with measurements of television-viewing times in hours per week.

Town A	Town B	Rural
35	27	8
43	15	14
36	4	12
39	41	15
28	49	30
28	25	32
29	10	21
25	30	20
38		34
27		7
26		11
32		24
29		
40		
35		
41		
37		
31		
45		
34		

(b) Draw box plots to visually compare television-viewing times for the 3 strata.

(c) Estimate the average television-viewing time, in hours per week, for (i) all households in the county, and for (ii) all households in town B. In both cases place a bound on the error of estimation.

(d) Estimate the total number of hours each week that households in the county view television. Place a bound on the error of estimation.

(e) The families in town A tended to be younger and have more children at home than those of town B. Is there a significant difference between average television-viewing time for families in these two towns?