

## Lab Handout

## Lab 3.1: The Election of '36

The instructions below are keyed to the lab instructions found on pp. 125-127 of the text. Please use those instructions as well in preparing your report. For your convenience, the table of voter population data is attached.

### Experimental Procedure

#### Data Collection

##### 1. Simple random sampling.

- Go into SAS/EIS to run the macro DICE. To access this macro, from any of the main SAS windows, select *Solutions: EIS/OLAP Application Builder: Applications: Run Private Applications*. From the resulting list, select the macro DICE by clicking once on its description. (**NOTE:** if SAS tells you no private applications exist, you haven't set up SAS/EIS properly. You will have to go through at least that part of the setup process.)
- Use the macro DICE to roll a 60-sided die 20 times (in case there are duplicates). A list of the results will appear in the output window.
- Select as your sample the 12 voters whose numbers correspond to the first 12 distinct digits from this list.
- Compute the sample proportion of "voters" voting for Roosevelt. Record the value as  $SRS = \underline{\hspace{2cm}}$ .

##### 2. Stratified random sampling.

- Divide the whole population into two strata by class. One is the lower class (L) and the other is upper and middle class (U).
- Choose a sample from each stratum by using the simple random sampling method described above. The sample size should be proportional to the population size of each stratum: 8 from the lower-class stratum and 4 from the upper- and middle-class stratum.
- Calculate the portion of "voters" in the lower-class sample voting for Roosevelt :  $p_l = \underline{\hspace{2cm}}$ . Calculate the portion of "voters" in the upper- and middle-class sample voting for Roosevelt:  $p_u = \underline{\hspace{2cm}}$ .
- Compute the estimate of the proportion of "voters" voting for Roosevelt for the whole population using the formula:  $STRAT = \frac{2}{3}p_l + \frac{1}{3}p_u = \underline{\hspace{2cm}}$

##### 3. Literary Digest sample survey.

Finally, pretend you are *Literary Digest*. You'll take a simple random sample from those people who own either telephones or cars or both. Choose 12 voters and calculate the sample proportion of "voters" voting for Roosevelt. Record the value as  $LD = \underline{\hspace{2cm}}$ .

- Calculate the true proportion of voters in the entire population voting for Roosevelt. Record it as  $p = \underline{\hspace{2cm}}$ .
- Give your SRS, STRAT, LD, and  $p$  to the TA who will collect the data from all of you and combine it into one data SAS set and make it available to you in the SASDATA library. When it is ready, you will be notified of the name of this data set.

### Analysis

When you have been told the name of the data set, open it in SAS/INSIGHT (*Solutions: Analysis: Interactive Data Analysis*). This data set contains three columns (one for SRS, one for STRAT and one for LD). Each row contains the estimates obtained from one lab group. Do a distribution analysis for each of SRS, STRAT, and LD, (Print the outputs; remember to click on *Fill page* and *Titles and footnotes*).

1. Compare the means of SRS, STRAT, and LD for the class with the true proportion of Roosevelt votes  $p$ . Which one is the closest to  $p$ ? Which one is the farthest?
2. Which one(s) varies a lot? Which one(s) varies a little? (Look at the histogram and the variance).

“VOTER” POPULATION DATA

VOTER	CLASS	CAR	PHONE	VOTE	VOTER	CLASS	CAR	PHONE	VOTE
1	L	N	N	R	31	L	Y	Y	R
2	L	N	Y	L	32	L	N	N	L
3	L	N	N	R	33	L	N	N	R
4	L	N	N	R	34	L	N	N	R
5	L	N	N	R	35	L	N	Y	L
6	L	N	N	R	36	L	N	N	R
7	L	N	N	R	37	L	N	Y	R
8	L	N	N	R	38	L	N	N	R
9	L	Y	Y	R	39	L	N	N	R
10	L	N	N	R	40	L	N	N	R
11	L	N	N	R	41	U	Y	Y	L
12	L	N	N	R	42	U	Y	Y	L
13	L	Y	Y	L	43	U	Y	Y	R
14	L	N	N	R	44	U	Y	Y	R
15	L	N	Y	L	45	U	Y	Y	L
16	L	N	N	R	46	U	Y	Y	L
17	L	N	N	R	47	U	Y	Y	L
18	L	N	N	R	48	U	Y	Y	L
19	L	N	N	R	49	U	Y	Y	L
20	L	N	N	R	50	U	Y	Y	L
21	L	N	Y	L	51	U	N	Y	R
22	L	N	N	R	52	U	Y	Y	L
23	L	N	N	R	53	U	Y	Y	L
24	L	N	N	R	54	U	Y	Y	L
25	L	N	Y	L	55	U	N	Y	R
26	L	N	N	R	56	U	Y	Y	L
27	L	N	N	R	57	U	Y	Y	L
28	L	N	Y	L	58	U	N	Y	R
29	L	N	N	R	59	U	Y	Y	L
30	L	N	N	R	60	U	Y	Y	L