

11.208 Final Problem Set

Question 1

You have been hired as a consultant to the U.S. Department of Transportation. The Department is concerned about the number of its employees who don't take public transit to work. Write a brief (2 paragraphs maximum) memorandum recommending two actions the Department could take to provide an incentive for workers who *presently drive alone, carpool, or vanpool* to take public transit. Make specific recommendations for the four largest agencies (as indicated by the number of survey respondents). Cite figures from queries you have performed on the DOT Employee Survey database as evidence for your recommendations.

Question 2

(A) Using the DOT Employee Survey database, print out a table listing the primary modes of travel to work (**mode1_to**) for DOT employees broken down by each of the 4 counties in and around Washington, D.C. These 4 counties are encoded as: 'Fairfax', 'Montg', 'P G', and 'Wash DC'. (The PG stands for Prince George County and Montg stands for Montgomery.) Your list should include the name of each mode of travel, not the code, and list the result in ascending alphabetical order by county and travel mode. Also, include a column that reports the average commuting distance for employees in each county-by-mode category.

(By the way, we've created a "lookup table" of travel mode names and codes. This could help you by displaying results with more descriptive language than codes. For example, in a results table you could display "drive alone" instead of "1" and so the results would be self-descriptive. The table can be found at `k:\11.208\data\dotmodpc.dbf`. To see an example of how to join dotmodpc to employee, see the very end of Lecture 4 notes. And if you like, you may of course create your own lookup tables for other fields!)

(B) What are the first and second most popular modes of travel in Montgomery County? What about in Prince George? Provide a brief interpretation of these data (both mode choice and average commuting distance). Do they seem to make sense?

(C) Now let's focus only on Montgomery County. Some of those employees living in Montgomery County also uses a secondary mode of transportation to get to work (**mode2_to**). How many Montgomery residents use a **secondary** mode? Among those who *didn't use* their secondary mode, what was the most popular **primary** mode? Besides providing the answers, please attach a copy of the SQL statements you used to generate this result (you can copy and paste from the SQL window in Microsoft Access).

Optional Credit: This DOT survey contains considerably more data about the demographics and transportation habits of DOT employees. Feel free to analyze the data further. Also, you can group the data by county or zip and then link it to ArcView® maps of the DC area to examine how travel patterns vary by distance from the center. See whether Virginia (with more sprawl and unregulated development) seems to be different from Maryland. Also, note that the DOT employees work in different locations and the travel patterns differ depending upon their work location.

Question 3

Because we at the [CRL](#) refer to the 1990 STF 3A data for Massachusetts frequently, we have already downloaded the entire contents of the STF 3A CD-ROM for Massachusetts and New Hampshire onto one of our file servers. Working with these files should be no different than working with the actual CD-ROM, except that the speed of processing may vary. These STF tables are located in the **crldata** locker on the MIT network. Use the following instructions to access this locker:

From a CRL computer, use the folder `J:\stf3a1990\ma_nh`.

On the Web, you can look at the page [U.S. Census 1990 STF3A Data](#). This page will let you view and download the data to your computer's local disk, but will **not** let you read the files in ArcView® **directly over the network**, which is more efficient.

Extract data from the 1990 U.S. Census STF 3A data to answer the following questions:

(A) Which **block group(s)** in **each** of the following Massachusetts counties have the **highest percentage** of employed persons (aged at least **16** years) who work for local, state or federal government? Your answer should include the *full* block group number(s) (i.e., with the state, county, tract and block group identifiers concatenated together) and percentage for **each** of these counties.

Counties: Hampden, Hampshire, Worcester

Note: Be careful about defining the universe for normalization here.

(B) Use the census block group map **K:\11.208\arcviewfiles\stateplane\mablgrp.shp** to make a thematic map in ArcView® for the three counties using the data on employment that you just collected for part (A). Make a **black-and-white** printout of your map. You *will* be graded on the attractiveness of your map as well as its accuracy. Make sure to follow the guidelines for producing effective maps described in class. It should include all of the following: a title; your name; date; data source; scale bar; north arrow; and a clear legend.

Question 4

The table **k:\11.208\data\bosdata.dbf** contains information from the 1990 Census on the educational attainment of people aged 25 years or older for each town in the Greater Boston area. You can use **k:\11.208\arcviewfiles\stateplane\boston.shp** in conjunction with the **bosdata.dbf** table to display these data in a map. Imagine that you have been hired by the state Department of Education to decide where to fund an adult education center for people *without a high school diploma*. The center should be located near the greatest possible number of people who have **not completed** a diploma. Consider the following types of maps:

1. A map showing the number of adults without diplomas in each town;
2. A map showing the concentration of adults without diplomas (persons per unit area) in each town;
3. A map showing the percentage of adults without diplomas within each town;
4. A map showing the percentage of the *regional* total (of all adults without diplomas) associated with each town.

Which one or two of these maps would you pick to help you with your decision? Would it be unwise to use one or more of these maps? Write a paragraph or two explaining the reasons for your selection(s), including some discussion of the minuses as well as pluses associated with your choice(s).

Propose a specific location for the adult education center. Write a paragraph justifying your choice. Next, create and print out the map(s) you chose above. Be sure to make your map clear, expressive and well-annotated. Indicate the location you proposed for the center on your map. The map should include a title, your name, date, data source, scale bar, north arrow, and a clear legend. Your map will be evaluated based on how accurately and clearly it illustrates real patterns in the data on a **black-and-white** printout, and on its reflection of good map design in general. Through the use of appropriate legends and annotation, your map should clearly describe the range and scale of both the geographic region and the variable being mapped.