

36-315: Statistical Graphics and Visualization

Lab 9

Date: March 11, 2003

Due: end of lab

Interspersed throughout this lab are some useful thought questions. You will be asked about them at check-off.

1. Download the files for this lab from the course web page.
2. Open a Word document to record your work.

Start R

3. Start -> Programs -> Class software -> R 1.5.1
4. Set the working directory to My Documents:

File -> Change dir...

5. Load the special functions for this lab:

```
source("lab9.r")
```

Load the data

6. `frame = read.csv("lab9.csv")`

`frame` contains three census variables, measured for each census tract in Pennsylvania:

PCI	Per-capita income
POPSPQMI	Population per square mile
PCTCOLL4	Percent of persons with an advanced degree

Three-dimension plots

7. Make a color plot with income as the coloring variable. In this and the following plots, use a log transformation on PCI and POPSPQMI and $\log(x + 1)$ on PCTCOLL4. *According to this plot, which variable is the stronger predictor of income?*
8. Using the `smooth` function, construct a prediction surface for `log(PCI)` from the transformed predictors. Use the default span.
9. View the surface using an interactive rotating display. Rotate to find a good viewpoint as described in handout 14 (look up hills and be just high enough to see everything).
10. Now make a still three-dimensional plot of the surface, setting `theta` and `phi` to match the good viewpoint you found. *According to this plot, when is population density an important predictor of income?*

11. Make a contour plot of the surface. Adjust the aspect ratio so that the contour lines obey the 45° rule. *Use this plot to elaborate on the previous answer.*
12. Construct a new surface with a properly tuned span and a new contour plot. Use the same rule as the span in two-dimensional plots: make it as small as possible without introducing too many small wiggles into the contours. *Does the new plot change your answer?*
13. Make a filled contour plot of the new surface. The legend on the side emphasizes the non-equal division into colors. *Does this plot help?*
14. Show us your graphs and answer the questions. Please do not ask to be checked off if you have not thought about the questions.