STAT 400 Data Analysis September 21, 2005

Today: Review of Loess and Questions 10-20

Bivariate Data: Ch 3 pp 87- 136
(Aspect Ratio, Loess, Residual Analysis, Bisquare, Fitting Process, Slicing)

1. What determines the **aspect ratio** which is best for data which estimates a functional relationship? (pp 90-91) What does the 45° banking achieve? (p89)

2. What is weighted regression, and when would you want to use it? (p96)

3. Describe in general terms the **loess** procedure. Assume for this description that α=.5 and λ=1. (pp 94-96)

4. How do you decide, in a particular application, what value of α and λ to use? (pp98-100)

5. What is the general shape of the weight function used for the weighted regression in loess, and how is it scaled? (pp 100-101)

6. Consider the context of bivariate data in which a predictive relationship is to be estimated for a variable Y based on a variable X. What kind of analysis leads to **residuals**? Why does one analyze residuals? What is the best way to analyse residuals? Does loess have a role here? (pp 102-104)

7. What do the "s" and "l" refer to in s-l plots? What does an s-l plot of residuals do to help in analyzing residuals? (p 50, p 105)

8. What is monotone spread, and what is a remedy for it? (pp 105-107)

9. Is it possible to eliminate monotone spread and nonlinearity simultaneously? (pp 106-107)

10. What is the purpose of the **bisquare** procedure when applied to data from which a predictive relationship for y from x is to be estimated? (pp 112-118)

11. Why does bisquare have to be an iterative procedure? How many iterations are needed? (pp112-118)

12. Can bisquare be used with simple linear regression? Can it be used with loess? (pp 117-118)

13. Can bisquare and loess be extended to the situation where there is more than one predictor variable?

14. How does bisquare determine if a residual is “big” and needs a small weight? (p 118)

15. In what context is **slicing** a useful strategy? (p 128)

16. Why are slices in Fig 3.40 (p 128) in a vertical direction? Generalize this.

17. In Fig 3.41 (p129) what role has the loess fit to the subsequent analysis?

18. Explain how Figure 3.43 (p131) is arrived at in the context of estimating the predictive relationship between Y=Babinet Point and X=Cube Root Concentration. (p 131)

19. What is Fig 3.44 (p 132) and what does the analyst look for in this display?

20. What use is the formula on p 133, and what is the basic idea behind it?

For loess, an R program.

```
smo
function (x,y,span=.5,...)
{
yl=loess(y~x,span=span,degree=1)
plot(x,y,col="black",type="p")
lines(x,predict(yl),col="blue",lwd=3)
}
```