

HOMEWORK ASSIGNMENT 5		Assigned: October 27, 2005
		Due: November 3, 2005
		10 Points – 1 point each day late

Steroid use problem from chapter 8.	
The data is in dataset " http://www.stat.lsu.edu/EXSTWeb/statlab/datasets/nknwdata/CH08PR06.txt ".	
A) 8.6	All parts
B) 8.7	All parts

American Scientist, September-October, 1984



“It figures. If there’s artificial intelligence, there’s bound to be some artificial stupidity.”

- 8.6. **Steroid level.** An endocrinologist was interested in exploring the relationship between the level of a steroid (Y) and age (X) in healthy female subjects whose ages ranged from 8 to 25 years. She collected a sample of 27 healthy females in this age range. The data are given below:

$i:$	1	2	3	...	25	26	27
$X_i:$	23	19	25	...	13	14	18
$Y_i:$	27.1	22.1	21.9	...	12.8	20.8	20.6

- Fit regression model (8.2). Plot the fitted regression function and the data. Does the quadratic regression function appear to be a good fit here? Find R^2 .
 - Test whether or not there is a regression relation; use $\alpha = .01$. State the alternatives, decision rule, and conclusion. What is the P -value of the test?
 - Obtain joint interval estimates for the mean steroid level of females aged 10, 15, and 20, respectively. Use the most efficient simultaneous estimation procedure and a 99 percent family confidence coefficient. Interpret your intervals.
 - Predict the steroid levels of females aged 15 using a 99 percent prediction interval. Interpret your interval.
 - Test whether the quadratic term can be dropped from the model; use $\alpha = .01$. State the alternatives, decision rule, and conclusion.
 - Express the fitted regression function obtained in part (a) in terms of the original variable X .
- 8.7. Refer to **Steroid level** Problem 8.6.
- Obtain the residuals and plot them against the fitted values and against x on separate graphs. Also prepare a normal probability plot. What do your plots show?
 - Test formally for lack of fit. Control the risk of a Type I error at .01. State the alternatives, decision rule, and conclusion. What assumptions did you make implicitly in this test?