

STAT 700, Fall 2011
Homework 6 Problems
due Wednesday October 26

2 Problems. Please follow the Lab report directions off the homework web page.

1. **Please read Lab3 Example 3: Logistic Growth of Chickens.** In the Nonlinear Regression Lab, we fit a logistic growth model to Chick #1 weight in the “ChickWeight” dataset.

(a) Fit a logistic growth model to Chick #43. Give the parameter estimates and summary of the fit.

(b) Use the `myplotnls`, that will take **only** an `nls` object and provide 2x2 summary plots. Make a summary plot of your `nls` fit to weight of Chick #43. How well does the model fit the data?

(c) Construct 95% CIs for *Asym*, *xmid* and *scal*

2. Create 100 observations where the underlying signal is a sine function with amplitude of 4 and a horizontal phase shift of π . Noise is added in the form of normal (Gaussian) random numbers with mean equal to zero and standard deviation equal to 0.5. The data should be generated by the equation

$$y_i = 4 * \sin(x_i - \pi) + \varepsilon_i$$

Recall that x should be in radians, so the easiest way to do this is create a sequence of 100 data points from 0 to 2π to use as your x values. Plot your data.

Demonstrate the importance of finding appropriate starting values when fitting a nonlinear model with nonlinear least squares. If the form of the model you are going to fit is

```
> nls(y~amp*sin(x-horshft), ...)
```

where ... are the other argument of `nls`. Use `start=list(amp=1, horshft=0)`. What are your estimates of the parameters *amp* and *horshft*? Show that if you start with initial estimates of *amp* and *horshft* closer to their true value, `nls` gives the estimates you want. For illustration, a print out of the summary of the fit is acceptable. What properties of the sine function might cause this behavior?