

NRES 746, Week 11, Lecture 1: Linear or Not?

Name: _____

Instructions: Work alone on Part 1 (about 5 minutes), then compare with a neighbor for Part 2. Keep laptops closed.

Part 1: Sort the models (individual)

Here are six models for a response Y and a continuous predictor x . In (f), a_{site} means a separate intercept for each of three sites.

(a) $Y \sim \text{Normal}(a + bx + cx^2, \sigma^2)$

(b) $Y \sim \text{Normal}(ax^b, \sigma^2)$

(c) $Y \sim \text{Normal}(a + b \log x, \sigma^2)$

(d) $Y \sim \text{Poisson}(e^{a+bx})$

(e) $Y \sim \text{Normal}\left(\frac{ax}{b+x}, \sigma^2\right)$

(f) $Y \sim \text{Normal}(a_{\text{site}} + bx, \sigma^2)$

1a. For each model, is the mean a linear function of the parameters (yes/no)? Could `lm()` fit it as written? Could `glm()`?

Model	Linear in the parameters?	lm()?	glm()?
(a)			
(b)			
(c)			
(d)			
(e)			
(f)			

Part 2: Compare (with a neighbor)

2a. Taking logs of the mean in (b) gives $\log(ax^b) = \log a + b \log x$, which is linear. Does that mean `lm(log(y) ~ log(x))` fits model (b)? What would it assume about the noise?
