

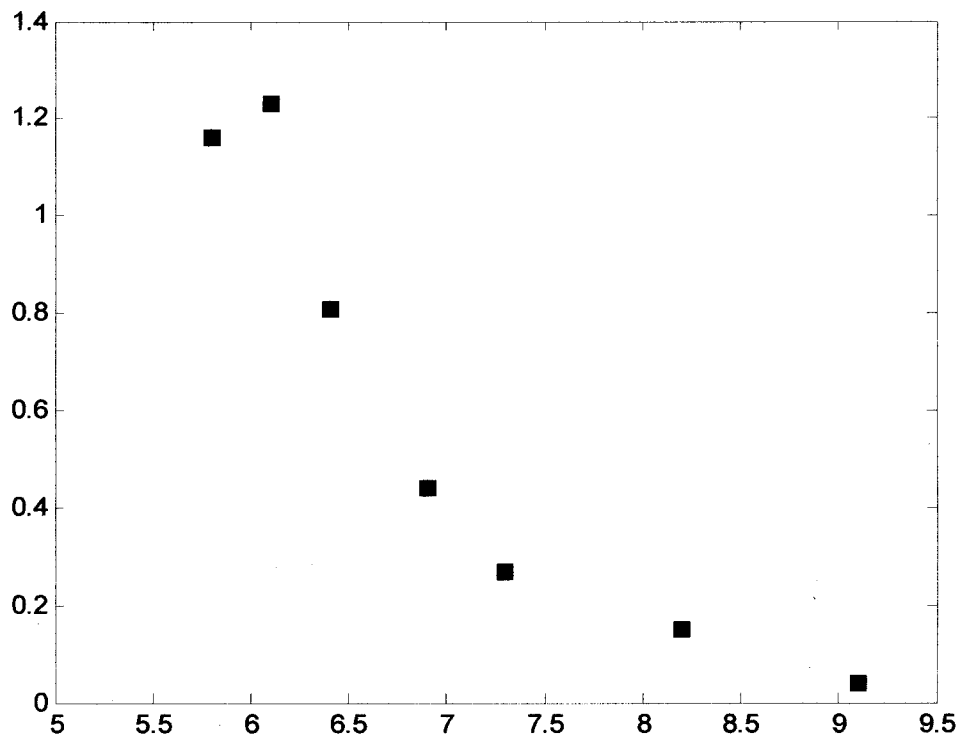
Mercury Contamination in Bass

To examine the factors that influence the level of mercury contamination, water samples were collected from several Florida lakes. The pH level was measured from these water samples, fish were taken from each lake and the mercury concentration in the muscle tissue was measured. The results are given in the table below. (Source: Lange, Royals & Connor (1993) *Transactions of the American Fisheries Society*)

pH	6.1	9.1	6.9	7.3	6.4	5.8	8.2
Mercury (in ppm)	1.23	.04	.44	.27	.81	1.16	.15

1. Find A power law model ($y=Cx^b$) for the data set.
2. Use the model to estimate the mercury concentration in the muscle of fish that live in a lake with a pH level of 7.0

Scatterplot for the dataset (x,y)



$$y=Cx^b$$

Start with the power law model

$$\log(y)=\log(Cx^b)$$

Take the log of both sides

$$\log(y)=\log(C)+\log(x^b)$$

Use the log properties to expand

$$\log(y)=\log(C)+b\log(x)$$

Use the log properties

The last equation is equivalent to the power law model, but it is a linear equation in the data set $(\log(x), \log(y))$. The slope is the constant b and the y-intercept is the constant $\log(C)$. We will use the Least Squares Method to find these coefficients. From these we can find C and b for the power law model.

The scatter plot below shows the linear relationship between $(\log(x), \log(y))$

$\log(x)$.7853	.9590	.8388	.8633	.8062	.7634	.9138
$\log(y)$.0899	-1.3979	-0.3565	-0.5686	-0.0915	0.0645	-0.8239

