

1) Consider the following data set: votes for preseason 1A basketball poll Nov. 22, 2011, WSIL News.

111 89 778 78 76

a) Find the sample mean \bar{Y} .

$$= \frac{\sum Y_i}{n} = \frac{1132}{5} = \boxed{226.4}$$

b) Find the sample standard deviation S .

$$= \sqrt{\frac{\sum Y_i^2 - n(\bar{Y})^2}{n-1}} = \sqrt{\frac{637386 - 5(226.4)^2}{4}} = \sqrt{\frac{381101.2}{4}} = \sqrt{95275.3} = \boxed{308.667}$$

c) Find the sample median $MED(n)$.

76 78 89 111 778

↑ $\boxed{MED(n) = 89}$

d) Find the sample median absolute deviation $MAD(n)$.

-13 -11 0 22 689 $= Y_i - MED(n)$ (ordered)
 0 11 13 22 689 $= |Y_i - MED(n)|$

$\boxed{MAD(n) = 13}$

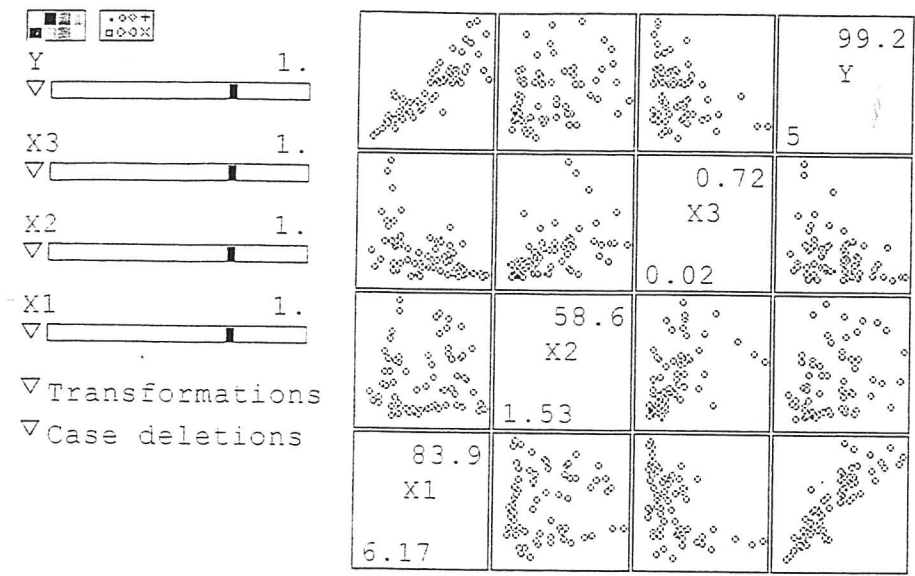
→ 2) Suppose A is a symmetric positive definite matrix with eigenvalue eigenvector pair (λ, e) . Then $Ae = \lambda e$ so $A^{-1}Ae = A^{-1}\lambda e$. Find an eigenvalue eigenvector pair for A^{-1} .

$$\underline{e} = \lambda A^{-1} \underline{e} \quad \text{or} \quad A^{-1} \underline{e} = \frac{1}{\lambda} \underline{e}$$

So $(\frac{1}{\lambda}, \underline{e})$ is an eigenvalue eigenvector pair

60
 missed it
 got it

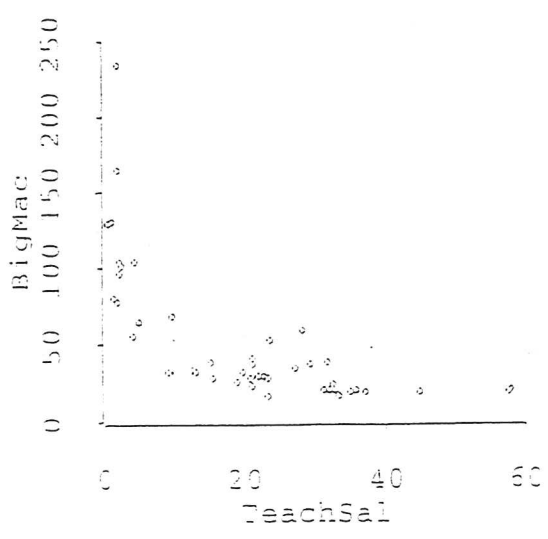
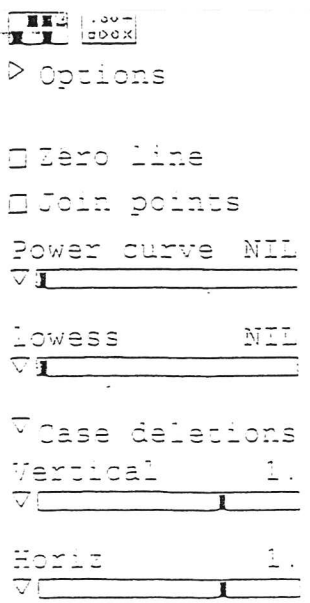
10



3) Use the above plot to give the transformations, if any, that you would use to remove strong nonlinearities from variables.

$\log(x_1)$, $\log(x_2)$, $\log(x_3)$, $\log(y)$

by log rule



4) The plot above shows $x = \text{TeachSal} =$ primary teacher salary in thousands of dollars vs $y = \text{BigMac} =$ minutes of labor needed to buy a Big Mac and fries. In the plot, $\lambda = 1$. Which transformation will increase the linearity of the plot, $\log(y)$ or y^2 ? Explain briefly.

$\log(y)$ need to spread small values of y
so make λ smaller