

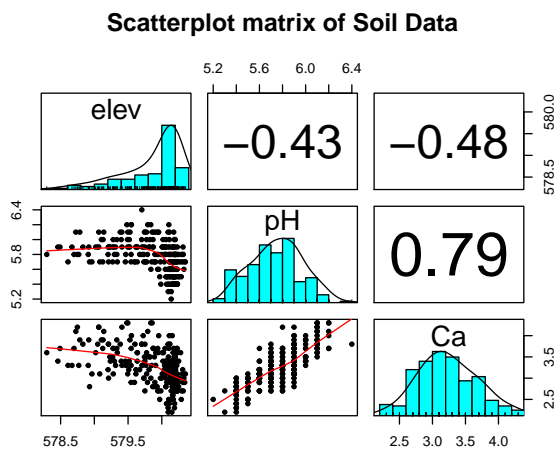
## STAT 217: Quiz 24

1. In a study of soil properties, 250 soil samples were taken. We'll work with three variables: response calcium concentration (ppm), and predictors pH (low numbers are acidic, high numbers basic, 7 is neither) and elevation (m). Data for the first six soil samples are shown below.

```
## elev pH Ca
## 1 578 5.8 3.6
## 2 578 5.9 3.4
## 3 578 5.9 3.7
## 4 579 5.8 3.7
## 5 579 5.8 4.2
## 6 579 6.1 4.1
```

- (a) Below is a pairs plot. Briefly describe the relationship between calcium and elevation.
- (b) In the pairs plot below, what is the number 0.79 on the right side of the plot telling you?

```
require(mosaic)
require(psych)
options(show.signif.stars = F)
pairs.panels(soil, pch = 20, ellipse = F, main = "Scatterplot matrix of Soil Data")
```



2. Use the table of regression coefficients to answer the following questions.

```
lm.soil <- lm(Ca~elev+pH,data=soil)
summary(lm.soil)

##
## Call:
## lm(formula = Ca ~ elev + pH, data = soil)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.6495 -0.1975  0.0184  0.1786  0.7436
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  95.0819    24.8366   3.83  0.00016
## elev        -0.1726     0.0425  -4.07  6.5e-05
## pH           1.4339     0.0849  16.90 < 2e-16
##
## Residual standard error: 0.265 on 247 degrees of freedom
## Multiple R-squared:  0.642, Adjusted R-squared:  0.64
## F-statistic: 222 on 2 and 247 DF, p-value: <2e-16
```

- (a) For each of the p-values in the table of regression coefficients above, write the null and alternative hypotheses. I did the first one for you to get you started.
- (b) Suppose you are particularly interested in the relationship between Calcium and pH. Write your conclusion for the coefficient of pH.
- (c) Explain, in a practical sense, what it means to describe the relationship between Calcium and pH after accounting for elevation.

\*\*\*\*Extra Learning\*\*\*\* Only complete if you have time, you will not be deducted points if you do not complete this section.

3. Using the data given on the first page, calculate the residual for the sixth soil sample.