

# Solution to HW 8

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## 9.9 AIC, Cp, BIC

Use step function in R and leap function in R.

The best model chosen by AIC is  $y = \beta_0 + \beta_1x_1 + \beta_3x_3$ .

The best model chosen by BIC is  $y = \beta_0 + \beta_1x_1 + \beta_3x_3$ .

The best model chosen by Cp is  $y = \beta_0 + \beta_1x_1 + \beta_3x_3$ .

## 9.15 b,c

From the scatterplot, we can see there will be a linear relationship between  $x_1$  and  $y$ . There may be a colinearity between  $x_1$  and  $x_2$ .

We first include all predictors, then we can find not all coefficients are significant. We use AIC. The suggested model is  $y = \beta_0 + \beta_1x_1 + \beta_3x_3$ .

## 9.16

The three best model chosen by Cp is  $M1 : y = \beta_0 + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \beta_{12}x_1x_2$ ,  $M2 : y = \beta_0 + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \beta_{33}x_3^2\beta_{12}x_1x_2$ , and  $M3 : y = \beta_0 + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \beta_{22}x_2^2 + \beta_{12}x_1x_2$ .

The Cp value is 3.30, 3.38 and 4.45 respectively. They do not differ too much.

## 9.19 a

If we use stepwise using pvalue  $\alpha_1 = 0.1$  and  $\alpha_2 = 0.15$ , then the model we select is  $y = \beta_0 + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \beta_{11}x_1^2$ . It is different from what we choose from the previous one. Because, we do selection sequentially and use the different criteria.

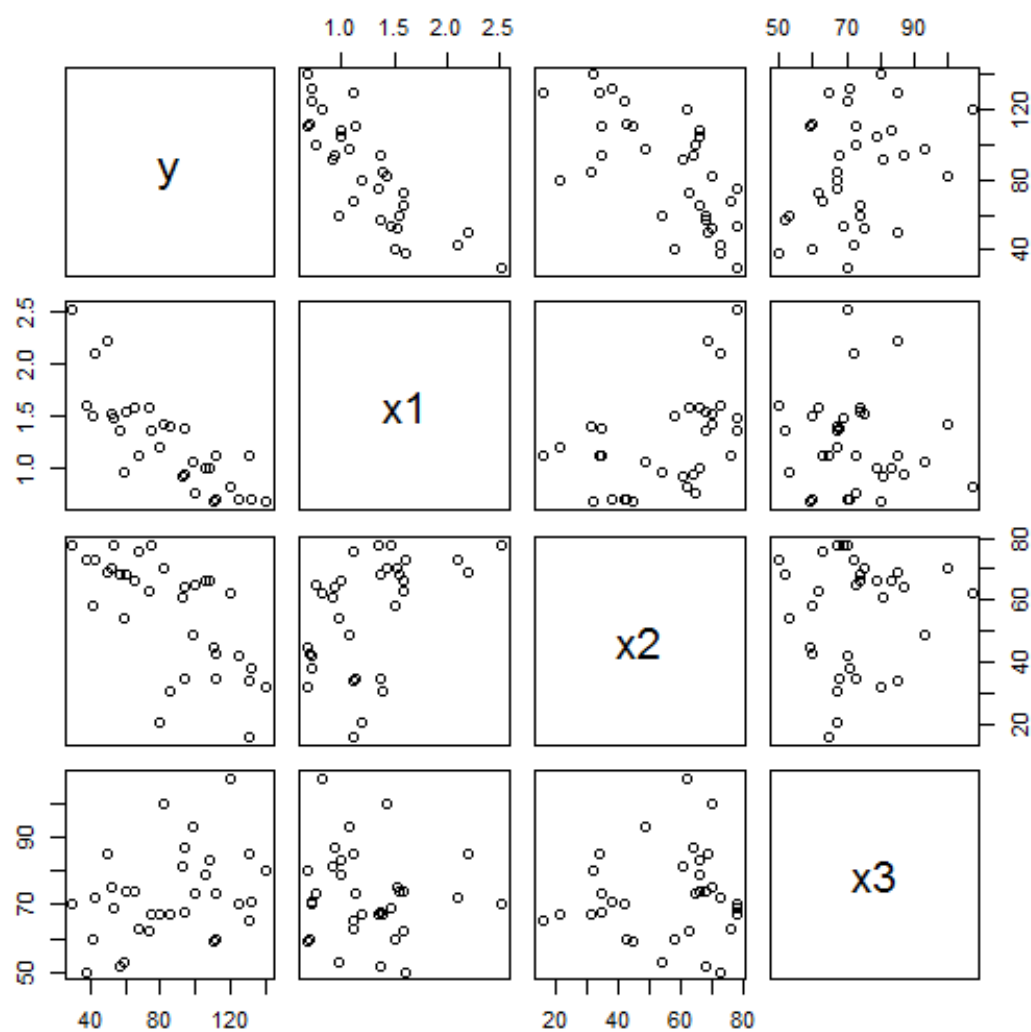


Figure 1: scatterplot