



Homework 4

Stat 151A, Fall 2017

Due: November 6

1. (2.5 points) Let $\hat{\beta}$ be the vector of coefficients from the regression of Y on X , with residuals \hat{e} . Let $b^{(p)}$ be the slope from the simple linear regression of $Y^{(p)}$ on $X^{(p)}$, with residuals $e^{(p)}$ (See Handout “Regression Diagnostics 4”). Then $e^{(p)} = \hat{e}$.
2. Consider the bodyfat dataset and consider fitting a linear model for the response variable BODYFAT in terms of the explanatory variables AGE, WEIGHT, HEIGHT, NECK, CHEST, ABDOMEN, HIP, THIGH, KNEE, ANKLE, BI-CEPS, FOREARM and WRIST.
 - (a) Using each of the following methods, perform variable selection to select a subset of the explanatory variables for modeling the response:
 - i. (0.5 points) Backward elimination using the individual p -values.
 - ii. (0.5 points) Forward Selection using p -values.
 - iii. (0.5 points) Adjusted R^2 .
 - iv. (0.5 points) AIC
 - v. (0.5 points) BIC
 - vi. (0.5 points) Mallow’s C_p .
 - (b) (1 points) Let M_1, \dots, M_6 denote the six models selected by each of the six variable selection methods of the previous part. Select one of these models by cross-validation.
 - (c) Let M be the model selected in the previous part.
 - i. (0.5 points) Fit this model to the data. 
 - ii. (1.5 points) Perform regression diagnostics. 
 - iii. (0.5 points) Comment on the validity of the assumptions of the linear model.
 - iv. (0.5 points) Identify influential observations and outliers.
 - v. (0.5 points) Delete them if necessary and re-fit the model.