

## Methods of Data Analysis II

### Homework 5

Name:

OSU-ID:

#### Instructions

- The homework is due on Friday, May 29th (in class). Late homeworks will not be accepted under any circumstances.
- You may work individually or in groups of 2 people. If you work in groups, you must include the names and OSU-ID numbers of all the students in the group and submit only one assignment per group.
- You must provide complete answers in order to receive full credit. The homework is worth 25 points.
- You must clearly indicate the problem that you are working.
- Homeworks must be stapled when submitted (including this sheet as a cover page). Do not use folders, paper clips or any other objects to keep the pages together.

1. Suppose that  $X_1$ ,  $X_2$  and  $X_3$  are three explanatory variables in a multiple linear regression model with  $n = 28$  observations. The following table shows the residual sum of squares and degrees of freedom for all the possible models:

Model Variables	$SS(Residual)$	$df(Residual)$
None	8100	27
$X_1$	6240	26
$X_2$	5980	26
$X_3$	6760	26
$X_1, X_2$	5500	25
$X_1, X_3$	5250	25
$X_2, X_3$	5750	25
$X_1, X_2, X_3$	5160	24

- Obtain the estimate of  $\sigma^2$  for each model.
- Compute  $R_{adj}^2$  for each model.
- Compute the  $C_p$  statistic for each model.
- Compute the  $BIC$  for each model.
- Determine which model gives:
  - the smallest estimate of  $\sigma^2$
  - the largest  $R_{adj}^2$
  - the smallest  $C_p$
  - the smallest  $BIC$

**Note:** You don't need to do any coding to solve this problem. You can do all the calculations by hand.