STAT 420: Homework #9

Spring 2015, Dalpiaz

Due: April 10, 3:00PM

Problem 1

For the `prostate` data, fit a model with `lpsa` as the response and the other variables as predictors.

```
library(faraway)
data(prostate)
```

    (a) Implement backward elimination variable selection method to determine the "best" model. Use $\alpha = 0.10$.

    (b) Implement backward AIC variable selection to determine the "best" model.

    (c) Compare the values of Adjusted R^2 for the full model, the "best" model from part (a), and the "best" model from part (b). Which model is the "best" model out of the three? Justify your answer

Problem 2

For the `teengamb` data, fit a model with `gamble` as the response and the other variables as predictors.

```
library(faraway)
data(teengamb)
```

    (a) Implement backward AIC variable selection to determine the "best" model.

    (b) Implement backward BIC variable selection to determine the "best" model.

    (c) Compare the values of Adjusted R^2 for the full model, the "best" model from part (a), and the "best" model from part (b). Which model is the "best" model out of the three? Justify your answer

Exercise 3

Do NOT use a computer for this problem.

The grade point averages of students participating in college sports programs at Anytown State University are compared. [1]

Sport	$i = 1$	$i = 2$	$i = 3$	$i = 4$	$i = 5$	Mean $(\bar{y}_j)$	Var (s_j^2)
Football ($j = 1$)	2.3	2.9	3.1	3.1	3.6	3.0	0.220
Basketball ($j = 2$)	2.8	3.3	3.8	3.1	3.5	3.3	0.145
Hockey ($j = 3$)	1.9	2.6	3.1	2.0	2.4	2.4	0.235

Consider the model $y_{ij} = \mu_j + e_{ij}$ with $e_{ij} \sim N(0, \sigma^2)$.

(a) At $\alpha = 0.05$, can one conclude that there is a difference in the mean GPA of the three groups? That is, test $H_0 : \mu_F = \mu_B = \mu_H$ at a 5% level of significance. Construct the ANOVA table, report the critical value and state your decision.

Exercise 4

Do NOT use a computer for this problem.

In order to rate three brands of a particular product, a consumer agency divided eighteen individuals at random into three groups and asked each one of them to rate one brand of the product on the scale from 0 to 100.

Brand	$i = 1$	$i = 2$	$i = 3$	$i = 4$	$i = 5$	$i = 6$	Mean $(\bar{y}_j)$	Var (s_j^2)
1 ($j = 1$)	66	72	77	81	87	85	78	64
2 ($j = 2$)	83	73	69	77	67	87	76	62
3 ($j = 3$)	85	74	85	88	89	95	86	48

Consider the model $y_{ij} = \mu_j + e_{ij}$ with $e_{ij} \sim N(0, \sigma^2)$.

(a) Test $H_0 : \mu_1 = \mu_2 = \mu_3$ at a 10% level of significance. Construct the ANOVA table, report the critical value and state your decision.

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[1] These data do NOT represent the professor's opinion of hockey and hockey players; go Blackhawks!