

HW4

4.10. In international reported low approval ratings for President Bush among traditional allies of the US, such as 32 percent in Canada, 30 percent in Britain, 19 percent in Spain and 17 percent in Germany. Let  $Y$  indicate approval of Bush's performance (1=yes, 0=no),  $\pi = P(Y = 1)$ ,  $c_1 = 1$  for Canada and 0 otherwise,  $c_2 = 1$  for Britain and 0 otherwise, and  $c_3 = 1$  for Spain and 0 otherwise.

a. Explain why these results suggest that for the identity link function,  $\hat{\pi} = 0.17 + 0.15c_1 + 0.13c_2 + 0.02c_3$ .

b. Show that the prediction equation for the logit link function is  $\text{logit}(\hat{\pi}) = -1.59 + 0.83c_1 + 0.74c_2 + 0.14c_3$ .

4.15. Use the data in Table 4.12 on page 127 to fit a logistic regression model with Merit Pay (yes, no) as the response variable, Race (black, white) and District (NC, NE, NW, SE, SW) as the predictors. Note both predictors are categorical in this case. The data set can also be found on our course website as pay.txt. Pay attention on how to write the table in the data frame format. 1). Based on your computer output, what is the effect of race on merit pay decision controlling for region? Is this effect significant?

District	Blacks, Merit Pay		Whites, Merit Pay	
	Yes	No	Yes	No
NC	24	9	47	12
NE	10	3	45	8
NW	5	4	57	9
SE	16	7	54	10
SW	7	4	59	12

2). Estimate the probability of getting a merit pay for a black in SW district; for a white in SW district.

4.30. The NCAA conducted a study of graduation rates for student athletes who were freshmen during 1984-85 academic year. The table below shows the data. Analyze the data and interpret the results, including description and inference.

Athlete group	Sample Size	Graduates
White females	796	498
White males	1625	878
Black females	143	54
Black males	660	197