# Homework Nov. 17 - selected answers

Assigned exercises: OpenIntro, Ch.9: 9.8, 9.10, 9.15, 9.17, 9.20.
Supplemental exercises linked via homework web page:
Ch.14: # 14.23, 14.24(a), 14.25, 14.30, 14.31, 14.32, 14.43, 14.44.

## Exercises from OpenIntro Ch. 9

(9.8) Learner status should be removed, since that would increase $R^2$.

(9.20) (a) False. Though the log-odds would change by the same amount, the predicted probability would not.

(b) True.

(c) False. Independent observations is a required condition for logistic regression.

(d) False. AIC is typically used in logistic regression instead of adjusted $R^2$.

## Exercises from supplement linked via homework web page

(14.23) (a) Proportion $= \frac{55}{3338}$. Odds $= \frac{55}{3338-55}$.

(b) Proportion $= \frac{21}{2676}$. Odds $= \frac{21}{2676-21}$.

(c) Odds ratio $= \frac{55}{3338-55} \times \frac{2676-21}{21}$.

(14.24) (a) Confidence interval $= b_1 \pm z^* SE_{b_1}$
$$= 0.7505 \pm 1.96 \times 0.2578 = (0.245, 1.256)$$
We are 95% confident that the increase in the log odds ratio of death from CVD for men with high BP is between 0.245 and 1.256 higher than for men with low BP.

(14.25) (a) Slope of odds ratio $= e^{b_1} = 2.118$
Confidence interval $= (e^{0.245}, e^{1.256}) = (1.278, 3.511)$  We are 95% confident that the odds ratio of death from CVD is higher by a factor between 1.278 and 3.511 for men with high BP compared to men men with low BP.

(14.43)

$$\ln\left[\frac{y}{1-y}\right] = b_0 + b_1(\text{Fruit})$$

where $y = $ probability of vigorous activity, and Fruit $= 1$ for those who eat fruit two or more times per day, and 0 otherwise.

To find $b_0, b_1$, use given data:

$\ln((663 - 169)/(471 - 68)) = b_0 = 0.2036$

$\ln(169/68) = b_0 + b_1 \Rightarrow b_1 = 0.7068$

Interpretation: The log odds of vigorous physical activity for those who eat fruit is 0.7068 higher than for those who don't eat fruit.

Or, the odds ratio of vigorous physical activity for those who eat fruit is higher by a factor of $e^{0.7068}$ compared with those who don't eat fruit.