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Lecture 7b: Practice Problem Solutions

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Example: CHD and Age

1. Recall the resulting logistic regression equation based on the sample of 58 subjects, relating CHD evidence to patient's age:

$$ln\left(\frac{p}{1-p}\right) = -6.54 + .135 \times Age$$

- Where *p* is the estimated probability of evidence (i.e., the estimated proportion of persons with CHD evidence) amongst persons of a given age

Example: CHD and Age

a) What is the estimated difference in the log (ODDS of CHD) for 60 year olds compared to 55 year olds, based on this equation?
   - We can actually evaluate this equation at Age = 60 and Age = 55 and take the difference:

$$ln\left(\frac{p}{1-p}; Age = 60\right) = -6.54 + .135 \times 60$$

$$ln\left(\frac{p}{1-p}; Age = 55\right) = -6.54 + .135 \times 55$$

Example: CHD and Age

a) What is the estimated difference in the log (ODDS of CHD) for 60 year olds compared to 55 year olds, based on this equation?
   - We can actually evaluate this equation at Age = 60 and Age = 55 and take the difference:

$$ln\left(\frac{p}{1-p}; Age = 60\right) = -6.54 + .135 \times 60$$

$$ln\left(\frac{p}{1-p}; Age = 55\right) = -6.54 + .135 \times 55$$

$$ln\left(\frac{p}{1-p}; Age = 60\right) - ln\left(\frac{p}{1-p}; Age = 60\right) = (60-55) \times .135 = 5 \times .135 = 0.675$$

Example: CHD and Age

b) What is the estimated odds ratio of CHD for 60 year olds compared to 55 year olds, based on this equation?
   - Now to get the odds ratio, recall:

$$ln\left(\frac{p}{1-p}; Age = 60\right) - ln\left(\frac{p}{1-p}; Age = 55\right) = \ln\left(\frac{\frac{p}{1-p}; Age = 60}{\frac{p}{1-p}; Age = 55}\right) = \ln(\hat{OR}) = 0.675$$

- So, $\hat{OR} = e^{0.675} \approx 1.96$

- So, these results estimate that 60 year olds have roughly twice the odds of having CHD evidence compared to 55 year olds