Stats for Clinical Trials, Math 150
Jo Hardin
Homework # 6, Due: Tues, 10/12/10

The following questions relate the to the `sepsis.csv` data. [Bernard, G. R., A. P. Wheeler, et al. (1997). "The effects of ibuprofen on the physiology and survival of patients with sepsis. The Ibuprofen in Sepsis Study Group." *N Engl J Med* 336: 912-8.] The goal of the study is to determine whether taking ibuprofen will increase survival and improve health of patients with sepsis (blood poisoning).

The data set contains information on patients from the Ibuprofen in Sepsis trial. The variables are as follows (note: a patient's APACHE score is a measure of the severity of disease, integer between 0 and 71, higher scores imply a more severe disease and a higher risk of death):

$$
\begin{aligned}
treat &= \begin{cases} 0 & \text{if patient received placebo} \\ 1 & \text{if patient received ibuprofen} \end{cases} \\
death30d &= \begin{cases} 0 & \text{if patient was alive 30 days after entry into the study} \\ 1 & \text{if patient was dead 30 days after entry} \end{cases} \\
race &= \begin{cases} 0 & \text{if patient was white} \\ 1 & \text{if patient was black} \end{cases} \\
apache &= \text{baseline APACHE score} \\
id &= \text{patient ID number}
\end{aligned}
$$

Note: to run a logistic regression you'll want to use

```
> sepsis.bu <- sepsis[c(race==1 & treat==0),]
> sepsis.logreg <- glm(death30d~apache, family="binomial", data=sepsis.bu)
> summary(sepsis.logreg)
```

1. Using a likelihood ratio test, test whether APACHE score is a significant predictor of death (use black treated patients).

2. Using a Wald test, test whether APACHE score is a significant predictor of death (again use black treated patients).

3. Repeat the two tests above for black untreated patients. Report on your results by comparing with your answers above.

4. (Unrelated to the data above). How can logistic regression used to test the hypothesis of equal odds in a $2x2$ table of counts? (I'm not asking about the χ^2 test.)