

Here we will use the `birthwt` data in the `MASS` package. You can access this dataset in R by issuing the following commands:

```
> library(MASS)
> data(birthwt)
```

A brief codebook for this dataset is:

'low' indicator of birth weight less than 2.5kg

'age' mother's age in years

'lwt' mother's weight in pounds at last menstrual period

'race' mother's race ('1' = white, '2' = black, '3' = other)

'smoke' mother's smoking status during pregnancy ('1' = smoker,
'0' = nonsmoker)

'ptl' number of previous premature labours

'ht' maternal hypertension ('1' = history of hypertension,
'0' = no history of hypertension)

'ui' presence of uterine irritability ('1' = uterine irritability
present,
'0' = uterine irritability
not present)

'ftv' number of physician visits during the first trimester

'bwt' birth weight in grams

Source:

Hosmer, D.W. and Lemeshow, S. (1989) *Applied Logistic Regression*. New York: Wiley

Fit the following linear regression model:

```
lm.out <- lm(bwt ~ age + I(age^2) + lwt + I(lwt^2) +  
as.factor(race)* ht + smoke + ui, data=birthwt)
```

Assume that all of the assumptions on pp. 113-114 of Fox (1997) hold. Then, using the model fitted above, do the following:

- Present the results in a table suitable for publication. Interpret the coefficient estimates, the residual standard error, and R^2 . Be sure to interpret the coefficient estimates in *substantive* terms. (9 points)
- Test the null hypothesis that, after adjusting for the other covariates in the model, expected birthweight doesn't vary across the levels of maternal smoking. Be specific about the null and alternative hypotheses, the test-statistic, the significance level of the test, and the statistical and substantive results of the test. (7 points)
- Test the null hypothesis that, after adjusting for the other covariates in the model, expected birthweight doesn't vary across the levels of maternal hypertension. Be specific about the null and alternative hypotheses, the test-statistic, the significance level of the test, and the statistical and substantive results of the test. (7 points)
- Test the null hypothesis that, after adjusting for the other covariates in the model, the expected birthweight of a child born to an African American mother is the same as the expected birthweight of a child born to a non-white non-African American mother. This null hypothesis specifies nothing about the weight of children born to white mothers. Be specific about the null and alternative hypotheses, the test-statistic, the significance level of the test, and the statistical and substantive results of the test. (7 points)