Exercise sheet 2

1. Show that $\hat{\sigma}^2 = \frac{1}{n}\hat{e}'\hat{e}$ is a consistent estimator of σ^2.

2. In `http://www.economicswebinstitute.org/data/wagesmicrodata.xls` you can find data for wage, education, work experience, sector, occupation, sex, marital status and other variables for 534 individuals sampled from the Current Population Survey of 1985. Consider the regression model

$$\begin{aligned}
\ln wage_i &= \beta_0 + \beta_1 female_i + \beta_2 union_i + \beta_3 nonwhite_i + \beta_4 hispanic_i + \\
&\quad + \beta_5 education_i + \beta_6 experience_i + \beta_7 experience_i^2 + e_i,
\end{aligned}$$

where details on the specification and variables can be found, for instance, in E.R. Berndt (1991) *The Practice of Econometrics, Classic and Contemporary*, Addison-Wesley Publishing. Using the `R` software (`http://www.r-project.org/`), obtain the projection matrices P and M for the regression above, the OLS estimates and standard errors of the parameters, the R^2, a test for joint significance of all parameters (except for the constant) and a test for equality of parameters across the subsamples formed by male and female observations using exclusively matrix algebra.