Assignment 4

1. Use the database car.dta on my website. You want to see what effect fuel efficiency (measured in mpg) has on the sale price of a new car.

   a. Using OLS, estimate the effect of fuel efficiency on car price, controlling for number of cylinders, engine displacement, horsepower, acceleration, year made, and vehicle weight.

   b. You worry that there may be unobserved heterogeneity of some sort (cars with poor gas mileage are crappier in other regards, or perhaps they are actually sportier or more powerful in some unmeasured dimension). You believe that country of origin is a valid instrument for fuel efficiency (perhaps because of more lenient fuel efficiency standards or cheaper gasoline prices, US-made vehicles are less fuel efficient than their Asian-made or European-made counterparts). Estimate the problem by IV, using dummies for origin as your instruments.

   c. Perform the appropriate post-estimation diagnostics: check whether you had an endogeneity problem at the 95% confidence level, check whether the instruments are weak, and check whether your instruments are endogenous at the 95% confidence level.

2. Time to play “god” again. This exercise is similar to one on the previous problem set: we have classical measurement error in our independent variable. This time, however, we will have two mismeasured values of x, called x1tilde and x2tilde. Generate data using this program:

   clear
   set obs 1000
   drawnorm x e m1 m2
   gen x1tilde = x + m1
   gen x2tilde = x + 2 * m2
   gen y = 2 + 3 * x + e
   drop x e m1 m2

   a. The true marginal effect of x on y is three. Work out what you would estimate the effect to be if you regressed y on x1tilde and x2tilde (individually). Do these regressions in Stata. In each case, test the hypothesis that the estimated coefficient is equal to its true value, and test the hypothesis that the estimated coefficient is equal to its theoretical expectation (given CME).

   b. Use IV to obtain unbiased estimates. Test the hypothesis that the estimated coefficient is equal to its true value.

   c. Perform the appropriate post-estimation tests.
Wooldridge: 15.1, 15.3, 15.6; C15.2, C15.3 (add one more step before (i.) through (iv.): estimate the model by OLS and by IV, using $\text{near4c}$ as an instrument for education); C15.9 (omit part (iii.), but then perform the Hausman test and a check for weak instruments).