Homework 9. Due Friday November 12th.

1. Prove that, for a standard normal, the integral

$$E\{\frac{z}{a+z}\} = \int_{-\infty}^{\infty} \frac{x}{a+x}\phi(x)dx\,,$$

does not exist. (Hint: integrate over an area around $-a$.)

Motivation: This shows up as the expectation of the IV-estimator in a very simple case. (See my handout.) This implies that the simplest IV-estimator can produce total garbage once in a while.

2. Monte Carlo study. Simulate a linear model for a variable y with one exogenous regressor x and one endogenous regressor w (a linear function of one or more instruments z and an error term in the x-equation correlated with the error term in the $y-$equation. Make the instruments weak (the coefficient to the instrument is small relative to the error variance). Try to use one instrument in generating the endogenous regressor or more instruments that are more weak.

Estimate the coefficients using OLS, standard IV, and LIML. Plot (or show percentiles for) the distributions of the coefficients to the endogenous regressor. Calculate the F-test for significance of the first stage and report them percentiles.