Economics 468

September 21, 2016 **R. Davidson**

Assignment 1

1 A random variable computed as the ratio of two independent standard normal variables follows what is called the **Cauchy distribution**. It can be shown that the density of this distribution is

$$f(x) = \frac{1}{\pi(1+x^2)}.$$

Show that the Cauchy distribution has no first moment, which means that its expectation does not exist.

Use your favorite random number generator to generate samples of 10, 100, 1,000, and 10,000 drawings from the Cauchy distribution, and as many intermediate values of n as you have patience or computer time for. **Note:** A Cauchy random variable can be generated as the ratio of two independent standard normal (N(0,1)) variables. For each sample, compute the sample mean. Do these sample means seem to converge to zero as the sample size increases? Repeat the exercise with drawings from the standard normal density. Do these sample means tend to converge to zero as the sample size increases?

1.23 Connect to the site of the U.S. Bureau of Economic Analysis,

http://www.bea.gov/itable,

and seek the series A067RC1 and A071RC1. These series should give you numbers for real disposable income and real consumption respectively, from the first quarter of 1969 to the second quarter of this year, 2016. Recover these (quarterly) data, and run a regression that might or might not represent the consumption function:

$$\log C_t = \alpha + \beta \log Y_t + u_t,$$

where C_t is consumption and Y_t is income. What is your estimate of the marginal propensity to consume out of disposable income?

Plot a graph of the OLS residuals for the consumption function regression against time. All modern regression packages will generate these residuals for you on request. Does the appearance of the residuals suggest that this model of the consumption function is well specified?