**Econ 301 Bilkent University**

**Econometrics Department of Economics**

**Lab Exercise**

Using the data given in the Table, estimate the model

$$Y\_{t}=β\_{1}+β\_{2}X\_{t}+u\_{t}$$

where *Y* = inventories and X = sales, both measured in billions of dollars.

1. Estimate the preceding regression.
2. Plot the residual terms. Do you observe any pattern?
3. From the estimated residuals find out if there is positive autocorrelation using the Durbin-Watson test.
4. Test for the negative autocorrelation.
5. If you suspect that the autoregressive error structure is of *order p,* use the Breusch-Godfrey test to verify this. How would you choose the order of *p?*
6. Gather the residual term
7. Regress the residual term on its *p* lags.
8. Calculate $\left(T-p\right)R^{2}\~χ\_{p}^{2}$
9. On the basis of the results of this test, how would you transform the data to remove autocorrelation? Show all your calculations.
10. If you decide to use OLS, then get the right estimates.
11. Repeat the preceding steps using the following model:

$$lnY\_{t}=β\_{1}+β\_{2}lnX\_{t}+u\_{t}$$

g. How would you decide between the linear and log-linear specifications? Show explicitly the test(s) you use.

Table

Inventories and Sales in U.S. Manufacturing, 1950-1991

 YEAR = Year

 SALES = Sales in U.S. Manufacturing, Millions of $

 INVENTORIES = Inventories in U.S. Manufacturing, Millions of $

 YEAR SALES INVENTORIES

 1950 38596 59822

 1951 43356 70242

 1952 44840 72377

 1953 47987 76122

 1954 46443 73175

 1955 51694 79516

 1956 54063 87304

 1957 55879 89052

 1958 54021 87055

 1959 59729 92097

 1960 60827 94719

 1961 61159 95580

 1962 65662 101049

 1963 68995 105463

 1964 73682 111504

 1965 80283 120929

 1966 87187 136824

 1967 90918 145681

 1968 98794 156611

 1969 105812 170400

 1970 108352 178594

 1971 117023 188991

 1972 131227 203227

 1973 153881 234406

 1974 178201 287144

 1975 182412 288992

 1976 204386 318345

 1977 229786 350706

 1978 260755 400929

 1979 298328 452636

 1980 328112 510124

 1981 356909 547169

 1982 348771 575486

 1983 370501 591858

 1984 411427 651527

 1985 423940 665837

 1986 431786 664654

 1987 459107 711745

 1988 496334 767387

 1989 522344 813018

 1990 540788 835985

 1991 533838 828184