Econ 301 **Bilkent University**
Econometrics **Department of Economics**

Lab Exercise

Using the data given in the Table, estimate the model

$$Y_t = \beta_1 + \beta_2 X_t + u_t$$

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

a. Estimate the preceding regression.
b. Plot the residual terms. Do you observe any pattern?
c. From the estimated residuals find out if there is positive autocorrelation using the Durbin-Watson test.
d. 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?*
   i. Gather the residual term
   ii. Regress the residual term on its *p* lags.
   iii. Calculate $(T-p)R^2 \sim \chi_p^2$
e. On the basis of the results of this test, how would you transform the data to remove autocorrelation? Show all your calculations.
f. Repeat the preceding steps using the following model:

$$lnY_t = \beta_1 + \beta_2 lnX_t + u_t$$

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