HW 5 (Due July 4, Friday, 12:00pm)

1. (30 pts.) Consider the following model:

$$HWORK = \beta_1 + \beta_2 \exp(LOFINC) + \beta_3[\exp(LRATE)]^{\beta_4} + \varepsilon.$$

Assume that the error term is heteroskedastic (but not autocorrelated). Using mwemp.db, construct a GAUSS program that can do the followings. (Do not use gmm_1.prg. Construct your own program.)

(1) (20 pts.) Estimate the model by GMM using (1,AGE,EXPP,EDU,exp(LOFINC)) as instruments. Report the variable names, estimated coefficients, standard errors, and t-statistics.

(2) (10 pts.) Test the model specification by Hansen's overidentifying restriction test.

2. (20 pts.) Consider a population that consists of three different groups, say, A, B, and C. Assume that $p_1 \times 100\%$ of the population belongs to Group A; $p_2 \times 100\%$, Group B; and $(1-p_1-p_2) \times 100\%$, Group C. Define a random vector $x = (y,z)'$ where:

y = 1 if X belongs to Group A; = 0, otherwise.
z = 1 if X belongs to Group B; = 0, otherwise.

Note that the joint probability density of y and z is given $f(y,z,p_1,p_2) = p_1^y p_2^z (1-p_1-p_2)^{1-y-z}$. Let $\{x_1, \ldots, x_T\}$ be a random sample from the population, where $x_t = (y_t,z_t)'$. Let $\theta = (p_1,p_2)'$.

(1) (10 pts.) Derive the ML estimator of θ.

(2) (10 pts.) Derive the covariance matrix of the ML estimator of θ.

3. (40 pts.) A binary choice model is given:

$$y_t^* = \beta_1(1-d_t) + \beta_2 d_t + \varepsilon_t;$$
$$y_t = 1 \text{ if } y_t^* > 0 \text{ and } y_t = 0 \text{ if } y_t^* < 0.$$

Assuming the ε_t are logistically distributed. The regressor d_t is a dummy variable. The data consist of 100 observations that are distributed as follows:

		y	
		0	1
d	0	24	28
	1	32	16

(1) (20 pts.) Obtain the MLE of β_1 and β_2.

(2) (10 pts.) Estimate the standard errors of your estimates of β_1 and β_2.

(3) (10 pts.) Compute the Wald statistic for H_o: $\beta_2 = \beta_1$.