

1. 是非題：(若你認為題目之敘述為非，請簡要說明理由) (30%)
- (1) Given random sampling and a large sample size (i.e., greater than or equal to 50), the sampling distribution of the sample mean will be normal even if the original population does not follow a normal distribution.
 - (2) Given random sampling and a small sample size (i.e., less than 50), the sampling distribution of the sample mean will be normal if the original population does follow a normal distribution.
 - (3) In the ANOVA model, the mean square within (MSW) is obtained by dividing the within sum of squares (SSW) by its degrees of freedom which is $N - J - 1$.
 - (4) In the ANOVA model, when there are just 2 groups (i.e., $J = 2$), the t critical value with v_2 degrees of freedom is equal to the square of the F critical value with $(1, v_2)$ degrees of freedom.
 - (5) It is possible that a third variable, W, could provide an explanation of the relationship between X and Y when $r_{XW} = 0$ but $r_{XW} > 0$.
2. 某學者對華裔居民之所得(以美元計算)進行之迴歸分析結果如表一，請依此表回答下列幾個問題：

表一 華裔美國居民所得之迴歸分析

變項	迴歸係數	標準誤	t 值
EDU	867.73	35.79	24.25
AGE	319.76	14.12	22.64
HOURS	181.76	11.75	15.46
PLACE	-1641.13	340.01	-4.83
PLACE*OCC	-6140.98	420.54	-14.60
截距(常數)	-13608.42	1078.33	-12.62
$R^2 = 0.2434$		$F = 466.947$	

EDU：教育年數

AGE：年齡

HOURS：平均每週工作時數

PLACE：出生地(美國出生者設定為0；台灣或中國大陸出生者設定為1)

OCC：職業(專門管理人員設定為1；其他職業設定為0)

PLACE*OCC：出生地與職業的乘積

- (1) 在其他條件相同的情況下，比較台灣或中國大陸出生之華裔與美國出生之華裔的平均收入(何者較高？高多少？)。(5%)
- (2) 在其他條件相同的情況下，比較非專門管理職業之台灣或中國大陸出生之華裔與非專門管理職業之美國出生之華裔的平均收入(何者較高？高多少？)。(10%)
- (3) 假設有一在台灣出生之華裔，受過16年教育，現年35歲，職業為專門管理人員，平均每週工作40小時。請估計其年收入有多少？(10%)

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3. Suppose that we estimated the bivariate regression of the wage rate (Y) on a dummy variable (X) which refers to whether or not the worker is employed by a large firm (where X is coded 1 if the worker is employed by a large firm, and 0 if the worker is employed by a small firm). Prove that the OLS estimate of the regression slope is equal to $\bar{Y}_L - \bar{Y}_S$ where \bar{Y}_L refers to the mean wage rate for workers in large firms and \bar{Y}_S refers to the mean wage rate for workers in small firms. (15%)

4. Suppose that you had data on the unemployment rate (U_t), the mean years of schooling (S_t), and the percent unionized (N_t) for the American labor force in each year from 1970 to 1993. Suppose that you want to estimate a regression model using these data to predict the unemployment rate in the t th year:

$$U_t = \alpha + \beta_1 S_t + \beta_2 N_t + \varepsilon_t$$

Explain how would you obtain appropriate estimates for this regression model. (15%)

5. Suppose that you want to estimate the following model that consisted of two equations:

$$Y_1 = \alpha_1 + \alpha_2 Y_2 + \varepsilon_1 \quad (1)$$

$$Y_2 = \beta_1 + \beta_2 Y_1 + \beta_3 X_1 + \beta_4 X_2 + \varepsilon_2 \quad (2)$$

Given that you have the data on $Y_1, Y_2, X_1,$ and X_2 , explain how you would obtain the best possible estimator (in terms of unbiasedness and efficiency) of α_2 . (15%)