114-1

淡江大學97學年度碩士班招生考試試題

114-1

系別：產業經濟學系　　科目：統　計　學

准帶項目請打「V」	
V	簡單型計算機

本試題共 2 頁，4 大題

答題須知：如需計算之題目請詳細寫出計算過程，而作答所需各分配之臨界值表列於試題第 2 頁。

1. (13 points) In a country, men constitute 60% of the labor force. The rates of unemployment are 5.6% and 4.2% among males and females, respectively.

   (a) (8 points) Based on the information provided above, please fill in the probabilities in the cells of the following table (Please copy this table in your answer sheet)

	Employed rate	Unemployed rate	Total
Percentage of Male in labor force			
Percentage of Female in labor force			
Total			100%

   (b) (5 points) If a worker selected at random is found to be unemployed, what is the probability that the worker is a woman?

2. (22 points) Let $X_1, X_2, \cdots, X_{20}$ denote a random sample of size 20 from the uniform distribution $U(1,0)$. Here $E(X_i)=1/2$ and $Var(X_i)=1/12$ for $i=1,2,....,20$, If $Y=X_1+X_2+.....+X_{20}$, then

   (a) (8 points) Please find the mean and variance of Y.

   (b) (8 points) Please find the probability that $Y \le 9.1$.

   (c) (6 points) What theorem do you apply for problem 2(b) and please briefly describe it.

3. (45 points) In a study of the relationship between the height of a man and of his son, X represents the height of father and Y represents the height of son, both in feet. The following are pieces of information about the sample

$$\bar{X}=5.7 \qquad \bar{Y}=6.2 \qquad N=8$$
$$S_{XX}=\sum(X-\bar{X})^2=1.68$$
$$S_{YY}=\sum(Y-\bar{Y})^2=0.88$$
$$S_{XY}=\sum(X-\bar{X})(Y-\bar{Y})=1.08$$

   (a) (5 points) Please compute the sample correlation coefficient (r_{XY}) between X and Y.

   (b) (5 points) Please state what is type I error and the meaning of α=0.05.

   (c) (10 points) Please construct a hypothesis testing about zero correlation when α=0.05.

   (d) (10 points) If we fit a linear regression of Y on X as follows

$$Y_i=\beta_0+\beta_1 X_i+e_i \qquad i=1,2,\ldots,8$$

   Please use the information provided and the method of least square to estimate β_0 and β_1.

   (e) (10 points) Let the significant level be 5%, please construct a hypothesis testing about if the influence of father's height on son's is significant.(hint: $SSE=\sum_{i=1}^{n}\hat{e}_i^2=S_{YY}-\frac{S_{XY}^2}{S_{XX}}$)

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114-2

114-2

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4. (20 points) Independent random samples of households in the four regions of country A yielded the data on last year's energy consumptions shown in Table 5-1

Table 5-1 Last year's energy consumptions for samples of households in four regions of country A

North	East	West	South
15	17	11	10
10	12	7	12
13	18	9	8
14	13	13	7
13	15		9
	12		

(a) (15 points) Please compute the sum of squares and construct the ANOVA table for the data given in Table 5-1.

(b) (5 points) With α=0.05, do the data provide sufficient evidence to conclude that a difference exists in last year's mean energy consumption by households among the four regions? Please construct your hypothesis testing.

References :

Table 1. The normal distribution

$P(Z > z_\alpha) = P(Z > 0.5) = 0.3085$

z_α	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.5	0.3085	0.3050	0.3015	0.2981	0.2946	0.2912	0.2877	0.2843	0.2810	0.2776
0.6	0.2743	0.2709	0.2676	0.2643	0.2611	0.2578	0.2546	0.2514	0.2483	0.2451
0.7	0.2420	0.2389	0.2358	0.2327	0.2296	0.2266	0.2236	0.2206	0.2177	0.2148

Table 2. Percentage points of the t distribution

Example: Pr(t>2.571)=0.025 when degree of freedom(df)=5

Pr \ df	5	6	7	8	9	10
0.025	2.571	2.447	2.365	2.306	2.262	2.228
0.05	2.015	1.943	1.895	1.860	1.833	1.812

Table 3. Upper percentage points of the F distribution

Example: Pr(F>4.49)=0.05 for N_1=1 and N_2=16

df for denominator N_2	df for numerator N_1				
	1	2	3	4	5
16	4.49	3.63	3.24	3.01	2.85
17	4.45	3.59	3.20	2.96	2.81
18	4.41	3.55	3.16	2.93	2.77
19	4.38	3.52	3.13	2.90	2.74