編號： 173

國立成功大學 104 學年度碩士班招生考試試題

系所組別：自然災害減災及管理國際碩士學位學程

考試科目：統計學

考試日期：0211，節次：3

※ 考生請注意：本試題不可使用計算機。 請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. City government has collected the following data on annual sales tax collections and new car registrations:

Annual sales tax collections (millions)	New car registrations (thousands)
1	10
1.4	12
1.9	15
2	16
18	14
2.1	17
2.3	20

Determine:

(1) The least square regression equation. (5%)

(2) Find the estimated sales tax collections if new car registrations total 25 using the result of (1). (5%)

(3) Calculate the coefficient of correlation and determination. (10%)

2. Below is the result from liner regression analysis. Answer the following questions from (1) to (5). (each 4%)

Variable	Regression Coefficient	Standard deviation	T statistics	P-value
Constant	14.18650	4.22980		0.00732
X	44.41385	0.84737	(1)	0.00000

ANOVA Table

Source	Sum of square	DF	MS
Regression	92547.3690	1	
Residual	336.8810	10	(2)
Total	92884.2500	11	

F statistics= (3)

(4) Calculate the confidence interval of β_1

(5) Test if H_0: $\beta_1=0$, $H_1\neq 0$

Given $\alpha=0.05$, $t(0.975, 10)=2.228$

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3. The personnel department of a large corporation has classified its employees according their sex and age. The proportion of employees falling into the various categories are shown in the following table:

	Under 30	30-45	Over 45
Male	11%	20%	24%
Female	9%	24%	12%

One employee is selected at random, and two events are defined as follows:

A: The employee selected is male.

B: The employee selected is under 30.

(1) Find the probabilities of P(A), P(B). (6%)

(2) Find the probability of $P(A \cup B)$, $P(A \cap B)$. (6%)

(3) Find the probabilities of $P(A|B)$, $P(B|A)$. (8%)

4. Suppose the number of customers entering a store within an hour is Poisson distributed with parameter $\lambda=10$. Given that there are 7 female customers entering that store during one specified hour, what is the probability that there are 3 male customers entering the store during the same hours? (20%)

5. There are 500 light bulbs in the sample and the mean life time is 1,100 hours and the sample standard deviation is 200 hours.

(1) Give a 95% confidence interval for the mean life time of a light bulb. ($Z_{0.0.25}=1.96$) (10%)

(2) What is the probability that the realized confidence interval covers the true mean life time? (10%)