

國立臺灣科技大學102學年度碩士班招生試題

系所組別：企業管理系碩士班甲組、乙組、丙組

科目：統計學

(總分為100分)

1. In Taiwan, health insurance program is managed by the Bureau of National Health Insurance (BNHI) and it covers 99% of the population. Citizens pay the premium and in exchange are granted the right to access any physicians or hospitals as he/she desires. In 2007, the national health expenditure is around 6.2% of GDP. About 85% of the hospitals and 98% of the primary clinics are private. Health care providers are reimbursed under the global budget system and fee-for-service mechanism the healthcare providers claim for services provided.
- A hospital is a healthcare institution that provides complete medical care ranging from diagnostic services, to surgery and nursing long-term care. There are many different types of hospitals that all specialize in different types of patients. General hospitals are set up to deal with diseases and injuries along with immediate and urgent threats to death. Hospitals typically have two types of patients: inpatients and outpatients. Inpatients are patients who stay overnight and seek long-term care. Outpatients are patients who stop in and leave once they are treated.
- To be sustainable, hospitals in Taiwan need to pay attention to the income they generate from their services. One private general hospital is examining the revenue from their inpatients. Following is a table with the duration of stay and the expenses of 265 inpatients who stayed in the hospital for 3 to 8 days in October, 2012:

Expenses NT\$	Duration of Stay (days)						Total
	3	4	5	6	7	8	
1 – 2,000	40	30	9	-	-	-	79
2,001 – 5,000	16	28	24	19	22	1	110
5,001 – 20,000	4	9	11	6	17	12	59
20,001 – 100,000	-	-	1	1	5	10	17
Total	60	67	45	26	44	23	265

Please carry 2 decimal places in all your calculation.

- 1a) Compute the average of "duration of stay" of all the 265 inpatients. (5 pts)
- 1b) Compute the average of "expenses" of all the 265 inpatients. (5 pts)
- 1c) How do you describe the modal pattern of "duration of stay" and "expenses"? (5 pts)
- 1d) Is "expenses" related to "duration of stay"? Justify your answer with statistical calculations. (10 pts)



國立臺灣科技大學102學年度碩士班招生試題

系所組別： 企業管理系碩士班甲組、乙組、丙組

科 目： 統計學

(總分為100分)

2. A researcher at St. Louis University conducted a study to determine whether entrepreneurs, newly hired managers, and newly promoted managers differ in their risk-taking propensities. For the purpose of this study, entrepreneurs were defined as individuals who, within 3 months prior to the study, had ceased working for their employers in order to manage their own business ventures. Thirty-one individuals of each type were selected to participate in the study. Each was asked to complete a questionnaire which required the respondent to choose between a safe alternative and a more attractive but risky one. Test scores were designed to measure risk-taking propensity. Lower scores are associated with greater conservatism in risk-taking situations. Summary statistics for the test scores of the 3 groups are given in the following table.

<u>Group</u>	<u>Sample Size</u>	<u>Sample Mean</u>	<u>Standard Deviation</u>	<u>Group Totals</u>
Entrepreneurs	31	71.00	11.94	2,201
Newly hired managers	31	72.52	12.19	2,248
Promoted managers	<u>31</u>	66.97	10.84	<u>2,076</u>
	93			6,525

Please carry 2 decimal places in all your calculation.

- 2a) Set up the ANOVA table for the data. (7 pts)
- 2b) Write the null and alternate hypotheses for the researcher. If you use symbols in your hypotheses, be sure to show their full meanings in this problem. (6 pts)
- 2c) What assumptions must be satisfied in order to do the ANOVA? (12 pts)



國立臺灣科技大學102學年度碩士班招生試題

系所組別： 企業管理系碩士班甲組、乙組、丙組

科 目： 統計學

(總分為100分)

X is a Bernoulli random variable with $P(X)=0.4$.

3. (5%) Derive $E(X^3)$
4. (5%) Derive $E(X^k)$ for $k>0$
5. (10%) Derive skewness of X

For regression model: $Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i$

6. (10%) Derive the OLS estimator ($\hat{\beta}_1$) for β_1
7. (20%) Show that $\hat{\beta}_1$ is unbiased

