

逢甲大學105學年度碩士班考試入學試題

編號：009 科目代碼：203

科目	統計學	適用系所	經濟學系	時間	90分鐘
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※請務必在答案卷作答區內作答。 共 三 頁 第 一 頁

一、選擇題 (50分)

1. A firm pays a wage of \$4 per hour to its 25 unskilled workers, \$6 to its 15 semiskilled workers, and \$8 to its 10 skilled workers. What is the *weighted average* wage (per hour) paid by this firm?
A) \$6 B) \$5.4 C) \$2.78 D) \$5.
2. Given that the sample size is 7711 in a *multiple* regression framework with 5 independent variable and an intercept term. What is the value of *standard error of regression (SER)* if the *residual sum of squares (RSS)* is 1696.49?
A) 0.47 B) 0.22 C) 0.68 D) 0.57
3. What is the consequence of a regression model falling into a *dummy variable trap*?
A) Resulting in a larger standard error of estimated coefficient.
B) Getting a smaller R-squared.
C) We are unable to get the estimated coefficients of the regression model.
D) All of the above.
4. Assume that X_1, X_2, \dots, X_n be independently and identically distributed with population mean of μ_X and population variance of σ_X^2 . The sample average,

$$\bar{X} = \frac{1}{n} \sum_{i=1}^n X_i,$$

is an estimator of the population mean, μ_X . Then What are the mean and the variance of the sampling distribution of \bar{X} ?

- A) $E(\bar{X}) = \mu_X$; $Var(\bar{X}) = \sigma_X^2$, B) $E(\bar{X}) = \mu_X$; $Var(\bar{X}) = \frac{\sigma_X^2}{n}$,
- C) $E(\bar{X}) = \frac{\mu_X}{n}$; $Var(\bar{X}) = \sigma_X^2$, D) $E(\bar{X}) = \frac{\mu_X}{n}$; $Var(\bar{X}) = \frac{\sigma_X^2}{n}$,
5. On a single toss of a die, we can get only one of six possible outcomes: 1, 2, 3, 4, 5, 6. They are mutually exclusive events. What is the probability of getting a 1, 2, 5 and 6 on a single toss of the die?
A) 1/3. B) 1/2. C) 2/3. D) 3/4
6. A statistics professor classifies his students according to their grade point average (GPA, random variable Y) and their gender (random variable X). The accompanying table gives the proportion of students falling into the various categories. One student is selected at random.

	Under 2.0 (Y = 0)	2.0-3.0 (Y = 1)	Above 3.0 (Y = 2)
Male (X = 0)	0.05	0.25	0.10
Female (X = 1)	0.10	0.30	0.20

What are the values of $E(Y)$ and $Var(Y)$?

- A) 1.25; 0.88 B) 1.22; 0.45 C) 1.15; 0.43 D) 1.24; 0.66
7. Following the above table listed in question 6, what is the value of $Var(Y|X=1)$?
 A) 0.7 B) 0.28 C) 0.6 D) 0.47
8. Which one of the following statements about the (*standard*) *normal distribution* is correct?
 A) A Normal distribution is a symmetric distribution and has a bell-shaped.
 B) Given that both X and Y are normal distributions and a and b are constants, the distribution of W , $W = aX + bY$, is also a normal distribution.
 C) The mean and variance of a standard normal distribution are 0 and 1 respectively.
 D) All of the above are correct.
9. Given that two random variables X and Y are *independent*, then which one of the following statement is true?
 A) $Var(aX + bY) = aVar(X) + bVar(Y)$, where a and b are both constants.
 B) The correlation coefficient between X and Y is 1.
 C) $Var(aX + bY) = a^2Var(X) + b^2Var(Y) + 2abCov(X, Y)$, where a and b are both constants.
 D) None of the above is true.
10. Given that $p(X, Y) = 0.5$, $p(Y|X) = 0.8$, and $P(Y) = 0.7$, and what is the value of $p(X|Y)$?
 (Please using the rules of conditional probabilities)
 A) 0.714 B) 0.28 C) 0.571 D) 0.4375

二、計算題 (50分)

1. You are given this information on the distribution of a random variable X .

x	1	2	3	4
$f(x)$	0.3	0.3	0.2	0.2

- (a) $E(X)=?$
- (b) $E(X^2)=?$
- (c) $\text{Var}(X)=?$

2. Suppose you are interested in the link between gender and academic performance in Econ course. You collect the data from your class ($n=50$) and perform a simple regression analysis. The result can be shown as follows:

$$\text{Econ Scores} = 70 - 5 \times \text{Male}$$

$$(3.5) (3)$$

where the variable *Male* indicates if the student is male. The numbers in the parenthesis are the standard errors.

- (a) What is your expected score for a female student?
- (b) Do you think there is a gap between male and female performance in your Econ class? Why?

3. A random variable Y is normal distributed with mean μ and variance σ^2 , and let $Z=\ln Y$.

- (a) Find the density function for Z .
- (b) Find the $E(Z)$.