所別：財務金融學系碩士班 甲組(一般生)　科目：統計　共 2 頁 第 1 頁
財務金融學系碩士班 乙組(一般生)
本科考試禁用計算器

＊請在試卷答案卷（卡）內作答

A. Ture/False/Uncertain Questions 是非不定題 (5% × 8 = 40%)

State with reasons whether the following statements are true, false or uncertain. Be precise and concise. No point will be graded if no explanation provided. (不論你認爲題意正確、錯誤或不一定皆須提示理由，否則不計分。) *You will get 2 pts off for each irrelevant point that appears in your answers.*

1. A large χ^2 statistic tells us that there is strong association between two categorical variables.

2. For data with a bell-shaped distribution, the inter-quartile range (IQR) is usually larger than its standard deviation s.

3. Given the joint distributions of random variables X and Y with their marginal means and variances as (μ_X, σ_X^2) and (μ_Y, σ_Y^2), respectively. Then $\mathbb{E}[X^2Y^2] \geq (\mathbb{E}[XY])^2$ holds true only under the case where X and Y are orthogonal.

4. The correlation coefficient implied from the following joint probability distribution of X and Y is negative.

	X		
Y	$x = 3$	$x = 0$	$x = -3$
$y = 100$	0.15	0	0
$y = 0$	0	0.60	0
$y = -100$	0	0	0.25

5. For a survey sample to be representative, it is better for the sample size to depends on the size of the population.

6. One shall look for $\bar{R}^2$ instead of R^2 to judge the goodness-of-fit of the regression model in the presence of heteroskedasticity or serial dependence.

7. The elements in a sample space must be disjoint and with chance equally likely.

8. The White's test for heteroskedasticity can also be applied to test for model specifications, in particularly against nonlinearities.

注意：背面有試題

B. Answering Problems (Total 60%)

1. The following tables show choices for paint colors and finishes at a hardware store. Find the Cramer's V for the contingency table with justifications. (10%)

	Color		
Gloss	Red	Green	Blue
Low	20	30	40
Medium	10	15	20
High	40	60	80

2. A die is rolled until the first time T that a five turns up.
   - Find $\mathbb{P}(T > 3)$. (5%)
   - Find $\mathbb{P}(T > 6|T > 3)$. (5%)

3. Suppose a professor at NCU has decided to use the following test for the final of this term: Each student tosses a fair coin by her/himself to determine her/his pass or failure for the statistics course. Calculate the size and power of this test. (5%)

4. Historically a bank expects about 5% of its borrowers to default (i.e., not pay back the money). The bank currently has 250 loans outstanding. The bank has reserves on hand to cover losses if 25 of these loans were to default. Suppose Jenny is using a binomial model to examine if these reserves be enough or not. What must she assume about the behaviors of these borrowers? Do these assumptions appear reasonable? (5%)

5. Let X, Y be random numbers chosen independently from the interval $[0, 1]$ with uniform distribution. Find the cumulative distribution and density of $Z = |X - Y|$. (10%)

6. Show that, if $X > 0$, then $\mathbb{P}(X > a) \leq \frac{\mathbb{E}(X)}{a}$. (10%)

7. Explain the following terms. (a) Simpson's paradox; (b) survival bias. (10%)