國立政治大學　112　學年度 碩士班暨碩士在職專班 招生考試試題

考試科目	統計學	系所別	財管所	考試時間	2月 3日(五) 第4節

簡答題 [100pts]

1. [5pts] When are two outcomes independent? Explain in terms of the rules of probability.
2. [5pts] What are the similarities and differences between the application of Chebyshev's theorem and the Empirical rule?
3. [5pts] What is the purpose of measuring correlation?
4. [5pts] What is the advantage of using ANOVA to test for differences among treatment means rather than testing all possible pairs of treatment means?
5. [5pts] What is the purpose of using a blocking variable in a two-way ANOVA?
6. [5pts] For a nonparametric test based on ranking the data, if a majority of the ranks are based on ties, what is the likely outcome of a hypothesis test? Why?
7. [5pts] It is known that the length of a certain product X is normally distributed with $\mu = 20$ inches and $\sigma = 4$ inches. For the probability $P(X > 28)$ related to $P(X < 16)$, which one is smaller?
8. [5pts] Suppose that for a certain baseball season, winning percentage, y, and on-base percentage, x, are linearly related by the least squares regression equation $\hat{y} = 2.9x - 0.48$. For this baseball season, the lowest on-base percentage was 0.310 and the highest was 0.362. Would it be a good idea to use this model to predict the winning percentage of a team whose on-base percentage is 0.156? Why or why not?
9. [5pts] Maggie computes a 95% confidence interval for p and obtains the interval [0.50,0.75]. Maggie's boss says, "Give me a 95% confidence interval for p − q." Calculate the answer for Maggie. Note. The probability for success is p and for fail is q here. p + q = 1.
10. [15pts] Carl selects one random sample from a population and calculates three confidence intervals for p. His intervals are below.

A	B	C
$\hat{p} \pm 0.08$	$\hat{p} \pm 0.04$	$\hat{p} \pm 0.072$

Match each confidence interval to its level, with levels chosen from: 80%, 90%, 95%, 98%, and 99%.

Note: Clearly, two of these levels will not be used. You do **not** need to explain your reasoning.

11. [5pts] Let P(A∩B)=0.3, and P(A∩B')=0.15, and P(A'∩B)=0.35. Compute P(A'∩B').
12. [5pts] A new blood test is being developed to screen patients for cancer. Positive results are followed up by a more accurate (and expensive) test. It is assumed that the patient does not have cancer. Describe the null hypothesis, the Type I and Type II errors for this situation, and explain which type of error is more serious.
13. [5pts] X ~ U(4, 10). Find the 30th percentile.
14. [5pts] A "friend" offers you the following "deal." For a $10 fee, you may pick an envelope from a box containing 100 seemingly identical envelopes. However, each envelope contains a coupon for a free gift.

備註	一、作答於試題上者，不予計分。 二、試題請隨卷繳交。

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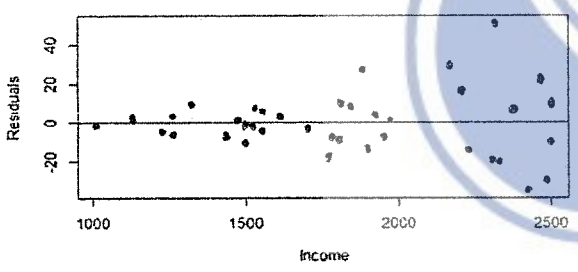
- Ten of the coupons are for a free gift worth $6.
- Eighty of the coupons are for a free gift worth $8.
- Six of the coupons are for a free gift worth $12.
- Four of the coupons are for a free gift worth $40.

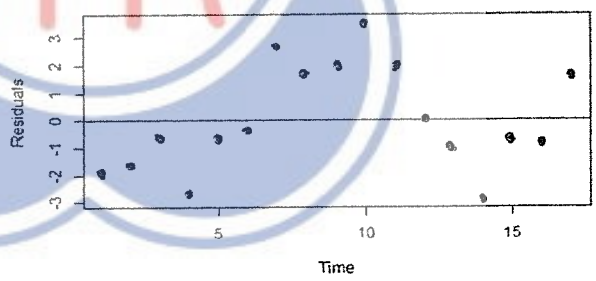
Based upon the financial gain or loss over the long run, should you play the game? Why?

15. [5pts] How many correct statements are below?
    A. A sample of convenience is a random sample.
    B. A statistic is a number that is a property of the population.
    C. You should always throw out any data that are outliers.
    D. Big data can be considered as a population.
16. [5pts] Given: uniform, exponential, normal distributions. Match each to a statement below.
    A. mean = median ≠ mode
    B. mean > median > mode
    C. mean = median = mode
17. [10pts] Suppose you have cross-section data and estimate the following model
    Consumption = β0 + β1Income + ε.
    You obtain the following residual plots. What is the assumption that is likely being violated for each plot?

A.



B.



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