

系所組別：企業管理學系乙組、國際企業研究所甲組

考試科目：統計學

考試日期：0223，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。

I. True or False (30 points, 3 pts each)*Notes:*

- (1) Answer questions using "T" or "F".
- (2) Write down your answers along with associated questions.
- (3) Label questions in numerical order.

1. If we repeatedly randomly draw 10 objects out of the population each time, then the average of sample means of all drawn samples will be approximately equal to the population mean.
2. The distance from the first quartile to the third quartile is less than the distance from the second quartile to the third quartile in a left-skewed distribution.
3. It is possible that a non-normal joint distribution has all marginal distributions which are normally distributed.
4. For non-negative real numbers, the geometric mean is always less than or equal to the arithmetical mean.
5. When conducting a hypothesis test, we tend to favor the alternative hypothesis if the power of the statistical test is higher.
6. If we scale up the independent variable in a simple linear regression model, the regression coefficient will be scaled down.
7. The unbiased estimator must be a consistent estimator while the biased estimator may or may not be a consistent estimator.
8. To determine whether two groups have the same proportion of successes, we can employ the z test or the chi-squared test.
9. The moving average method used to predict the future values is better for the short-term forecasting rather than for the long-term forecasting.
10. If two random variables have a significantly negative relationship, then their covariance should be close to negative one.

(背面仍有題目，請繼續作答)

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II. Choose the BEST answer (45 points, 3 pts each)

Notes:

- (1) Answer questions using "A", "B", "C", or "D".
- (2) Write down your answers along with associated questions.
- (3) Label questions in numerical order.

Use the following information to answer Questions 1 to 5.

A mobile phone retailer is going to conduct a survey to know whether consumers favor Android-based over IOS-based (i.e., Iphone) smartphones. The current market share for Android smartphones is 80% while the Iphone takes 20% of the market share.

1. What is the probability for the next three people who take the survey and favor Android smartphones?

(A) 0.488
(B) 0.512
(C) 0.008
(D) 0.992
2. The mean number of people who take the survey and favor Android smartphones is 115.2. What is the actual number of people participating in this survey

(A) 144
(B) 255
(C) 576
(D) 625
3. What is the standard deviation of the number of people who take the survey and favor Android smartphones?

(A) 10.0
(B) 6.4
(C) 4.8
(D) 9.6
4. What is the confidence interval for the number of people who take the survey and favor Android smartphones at 95% confidence coefficient using normal distribution approximation?

(A) [102.66, 127.74]
(B) [96.38, 134.02]
(C) [95.60, 134.80]
(D) [105.97, 124.68]

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5. Following the Chebyshev's rule, we construct a confidence interval using 2 standard deviations. What is the number of the people who take the survey and favor Android smartphones within this confidence interval?

(A) 92
(B) 108
(C) 192
(D) 470

Use the following information to answer Questions 6 to 10.

A macroeconomist tries to forecast GDP levels (in billions) using the exponential smoothing method.

6. What is the exponential smoothing constant, aka the smoothing factor or the weight, in a model without any extra components if the forecasted GDP level of the current period is 2.392 while the actual GDP level is 2.4 of the current period and the forecasted GDP level was 2.2 in the previous period?

(A) 0.98
(B) 0.96
(C) 0.94
(D) 0.92

7. If the actual GDP level of the current period is 3.0, what is the forecasted GDP level of the next period?

(A) 2.824
(B) 2.835
(C) 2.914
(D) 2.968

8. Adopting an exponential smoothing method with a trend component, he uses 0.24 as the smoothing constant for the trend component and 0.8 as the smoothing constant for the current actual GDP component. If the current actual GDP is 2.4, forecasted GDP level in the previous period was 2.2 and forecasted trend component in the previous period was 1.1, what is the forecasted GDP level of the current period?

(A) 2.58
(B) 2.56
(C) 2.54
(D) 2.52

9. Based on Question 8, what is the forecasted trend component of the current period?

(A) 0.9498
(B) 0.9385
(C) 0.9272
(D) 0.9169

(背面仍有題目，請繼續作答)

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10. The macroeconomist expects to construct a confidence interval by scaling up and down the forecast made using the exponential smoothing method with a trend component by 20%. Therefore, based on Questions 8 and 9, what is the confidence interval for the forecasted GDP level of the 2 periods ahead?
- (A) [3.5389, 5.3083]
 (B) [3.5475, 5.3213]
 (C) [3.5566, 5.3350]
 (D) [3.5659, 5.3489]

Use the following information to answer Questions 11 to 15.

A mutual fund manager currently analyzes three possible investment strategies and has a payoff table as follows:

[unit: million]

Strategy	Market States		
	Bear (0.3)	Flat & Oscillating (0.5)	Bull (0.2)
BH	\$1,200	\$1,500	\$3,000
CM	\$1,000	\$3,000	\$2,600
CPPI	\$1,500	\$1,000	\$4,000

BH: Buy-and-Hold strategy. CM: Constant Mix strategy. CPPI: Constant Proportion Portfolio Insurance strategy. Probabilities for market states are in the parentheses.

11. If this mutual fund manager adopts the maximin criterion, which strategy will be chosen?
- (A) BH
 (B) CM
 (C) CPPI
 (D) either CM or CPPI
12. If this mutual fund manager adopts the maximax criterion, which strategy will be chosen?
- (A) BH
 (B) CM
 (C) CPPI
 (D) either BH or CM
13. How much is the opportunity loss for adopting the CM strategy in the bull market state?
- (A) \$1,000
 (B) \$1,200
 (C) \$1,400
 (D) \$1,800

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14. If this mutual fund manager adopts the minimax regret criterion, which strategy will be chosen?
- (A) BH
(B) CM
(C) CPPI
(D) either strategy is as good as the other.
15. What is the maximum amount for this mutual fund manager would pay for the information in order to reduce the uncertainty?
- (A) \$110
(B) \$250
(C) \$320
(D) \$430

III. Partial Credit Question and Fill in the Blanks (25points, 5 pts each)

Notes:

- (1) Write down your answers along with associated blanks.
- (2) Label blanks in alphabetical order.

1. A financial analyst tries to understand whether a collected daily return sequence of the Minionrush market index is random or not. There are two return patterns observed in this sequence: up (denoted as U) or down (denoted as D). A run (denoted as R) is defined as a maximal non-empty sequence of adjacent like elements. There are currently 6Us and 8Ds.

(1) How many runs do we have for the following sequence? (a)

UUDDDUUDDDUDDU

(2) What is the probability of $R = 5$ for the collected return sequence? (b)

(3) What is the probability of $R \leq 3$ for the collected return sequence? (c)

(4) What are the mean and variance of runs for the collected return sequence? mean= (d) ;
variance= (e) ;