

※ 考生請注意：本試題可使用計算機。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)

1. It is possible that you have a statistical significance result but do not have any distinct practical difference.
2. The skewness is always defined and it is possible to find extremely large observations in the collected data when data show positive skewness.
3. The mode in statistics usually indicates the value at which the associated distribution has its maximum. However, there are possible many local maximum values in a distribution, which makes the mode not unique.
4. The fat-tailed distributions might have excess kurtosis or small skewness.
5. In general, the correlation between variables is invariant to how they are measured.
6. As long as the sample size increases, the distinction between independent and dependent samples is not that essential when performing statistical tests.
7. If the probabilities of two events add up to one, then these two events will be mutually exclusive.
8. When we perform multiple comparisons, we could apply the Type I error rate in original ANOVA to each independent comparison test and still obtain the same Type I error rate as in original ANOVA.
9. The association between variables might not be the causal relationship between variables in reality.
10. The standard deviation is one of dispersion measures which have not the same unit as the location measure of the same variable.

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**II. Multiple Choice Questions (Choose the BEST answer, 45 points, 3 pts each)**

Use the following information to answer Questions 1 to 5.

Wasowski country generally uses two major macroeconomic policies, monetary (M) and fiscal (F) policies, to boost the economy while other (O) economic measures other than monetary and fiscal policies might be adopted. (Assuming at least one of M, F, and O policies will be adopted)

1. If the probability of using O is 64% once Wasowski uses F, what is the probability of using M under the adoption of F? (Assuming either M or O, but not both, will be adopted together for sure)  
  - (A) 36%
  - (B) 48%
  - (C) 50%
  - (D) Insufficient information
2. Under the adoption of F, the economic growth rate is 2.2% once the M is adopted together while the economic growth rate is 1.4% once the O is adopted together. What is expected conditional growth rate if either M or O is adopted under the adoption of F?  
  - (A) 1.45%
  - (B) 1.58%
  - (C) 1.68%
  - (D) Insufficient information
3. If the probability of using F is 50% and the probability of using M without F and O is 30%, what is the probability of using M?  
  - (A) 25%
  - (B) 36%
  - (C) 48%
  - (D) Insufficient information
4. What is probability of using O?  
  - (A) 48%
  - (B) 52%
  - (C) 64%
  - (D) Insufficient information
5. What is the probability of adoption of O under the adoption of M and F together?  
  - (A) 0%
  - (B) 12%
  - (C) 36%
  - (D) Insufficient information

Use the following information to answer Questions 6 to 10.

The normally-distributed daily return of Stock A has a 95% ( $\alpha = 5\%$ ,  $Z_{\frac{\alpha}{2}} = 1.96$ ) confidence interval of [LCL, UCL]=[-0.0456%, 0.0916%] (LCL: lower confidence limit; UCL: upper confidence limit) (Assuming the number of trading days in a year is 250 trading days)

6. What is the average daily return of Stock A?  
(A) 0.023%  
(B) 0.024%  
(C) 0.025%  
(D) 0.026%
7. What is the volatility of daily returns of Stock A?  
(A) 0.033%  
(B) 0.034%  
(C) 0.035%  
(D) 0.036%
8. What is the average annual return of Stock A?  
(A) 2.75%  
(B) 3.15%  
(C) 4.23%  
(D) 5.75%
9. What is the volatility of annual returns of Stock A?  
(A) 0.45%  
(B) 0.55%  
(C) 0.65%  
(D) 0.75%
10. What is the mean range of Stock A according to Parkinson's (1980) range estimate?  
(A) 0.84%  
(B) 0.92%  
(C) 1.25%  
(D) Insufficient Information

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**Questions 11 to 13 belong to the Same Group of Questions.**

11. A financial analyst regularly issues the predictions of economic upturns and downturns which are distributed as a binomial distribution with a mean of 15 (correct predictions) and a variance of 10.5. What is the probability of incorrect predictions?
- (A) 70%  
 (B) 75%  
 (C) 80%  
 (D) 85%
12. What is the number of predictions we employed in Question 11 for evaluation of the mean and the variance for this specific financial analyst?
- (A) 20  
 (B) 50  
 (C) 80  
 (D) 100
13. If the average number of predictions in a year issued by this specific manager is 10, what is the possibility that this specific manager has more than one correct prediction in a year?
- (A) 57.68%  
 (B) 65.43%  
 (C) 72.45%  
 (D) 80.08%

**Use the following information to answer Questions 14 to 15.**

The following table is a research survey which indicates correct and incorrect predictions of economic conditions issued by large and small brokerage firms, respectively.

	Brokerage Size		Total
	Large	Small	
Correct	10	2	12
Incorrect	2	10	12
Total	12	12	24

14. What is the marginal probability that small brokerage firms make less than and equal to two correct predictions?
- (A) 14.35%  
 (B) 15.35%  
 (C) 16.64%  
 (D) 17.56%
15. Does the survey support that the sizes of brokerage firms matter in the correct prediction rate?
- (A) Supported  
 (B) Unsupported  
 (C) Either supported or unsupported  
 (D) Insufficient Information

### III. Partial Credit Questions 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 CEO of an international company tries to construct a model which can be used to delineate the sales. Currently, she finds that sales are mainly affected by advertising expenditures. The data show that sales ( $S_t$ ) have a mean ( $\mu_s$ ) of \$8.25M and a standard deviation ( $\sigma_s$ ) of \$10.24M and advertising expenditures ( $AE_t$ ) have a mean ( $\mu_{AE}$ ) of \$1.24M and a standard deviation ( $\sigma_{AE}$ ) of \$1.05M. (M represents million) The joint distribution of sales and advertising expenditures is normal with the correlation coefficient of 0.85. If the conditional expected sales given advertising expenditures can be expressed as follows:

$$E(S_t|AE_t) = \beta_0 + \beta_1(AE_t - \mu_{AE}),$$

- (1) What is the estimated value of  $\beta_0$ ?     (a)
  - (2) What is the estimated value of  $\beta_1$ ?     (b)
  - (3) What is the conditional variance of sales given advertising expenditures?     (c)
2. We have the following relationship between GDP, Money Supply (MS) and Fiscal Expenditure (FE): (unit: billion,  $t$ : year)

$$GDP_t = 1.2 + 0.23MS_t + 0.45FE_t + \varepsilon_t, t = 1, 2, \dots, T$$

Currently, the money supply has a time trend effect

$$MS_t = \alpha \times t + \varepsilon_t,$$

and for the past ten years  $\sum_{t=1}^{10}(t \times MS_t) = 134.75$ .

- (1) What is the estimated value of  $\alpha$  using the ordinary least squares method?     (d)
- (2) What is the coefficient estimate of the time trend for GDP?     (e)