

考 試 科 目	統計學 A	系 所 別	金融學系金融管理組	考 試 時 間	2 月 10 日 (四) 第 4 節
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## Short Answer Questions

Mark the blank number and write your answer on the answer sheet.  
Do NOT provide any details. Each blank worths 5 points.

- The price setting decision in an economy follows geometric distribution and is independent over time periods. If the probability that a firm can update its price in one period is  $1 - \theta$ , the average duration of the price is (1) periods, and the probability that the price sustains more than three periods is (2).
- Consider two random variables  $X, Y$  and one nonrandom variable  $Z > 0$  such that  $E(XY) = 1$  and  $E(XZ) = 1$ . If  $Var(X) = \sigma_X^2$ ,  $Var(Y) = \sigma_Y^2$ , and the linear correlation of  $X$  and  $Y$  is  $\rho_{XY}$ , then  $E(Y) =$  (3), and the upper bound of  $E(Y) - Z$  is (4).
- Consider a random sample of size 100 drawn from the population with mean  $\mu_X$  and the sample standard deviation is 2. If a test is  $H_0: \mu_X \leq 5$  against  $H_1: \mu_X > 5$  and the significance level is 5%, the decision rule of this test is (5). If the true population mean is  $\mu_X = 5.6$ , the type-II error rate of this test is  $\Pr(Z \leq q)$  where  $q =$  (6).
- Let  $lghe$  be log of hourly earnings,  $female = 1$  if the person is female,  $educ$  be years of education, and  $edufe = educ \times female$ . The regression results based on 200 observations of  $lghe$  on other variables are listed below with standard errors in parentheses. Each regression includes the intercept but its value is not reported.

	I	II	III
<i>female</i>	-0.166 (0.054)	-0.203 (0.048)	-0.187 (0.089)
<i>educ</i>		0.102 (0.010)	0.090 (0.013)
<i>edufe</i>			0.034 (0.021)
$R^2$	0.019	0.202	0.207

Based on model III, the average ratio of female earnings to male earnings given twelve years of education is (7), and the test statistic for the overall significance of *educ* is

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\_\_\_\_(8)\_\_\_\_ (distribution and value). To test whether the sum of coefficients on *educ* and *edufo* equals 0.1 by a t-test, the regression model has to be specified as \_\_\_\_ (9) \_\_\_\_ . On the other hand, one can infer that the regression coefficient of *educ* on *female* is \_\_\_\_ (10) \_\_\_\_ .

- Consider a liner model  $Y_i = \beta_0 + \beta_1 X_i + u_i$ ,  $i = 1, 2, \dots, n$  and  $E(u_i|X_i) = 0$ . However,  $X_i$  can only be observed by  $\tilde{X}_i$  where  $\tilde{X}_i = X_i + w_i$ ,  $Cov(X_i, w_i) = 0$  and  $Cov(u_i, w_i) = 0$ . In the regression of  $Y_i = \beta_0 + \beta_1 \tilde{X}_i + e_i$ , one can derive that  $Cov(\tilde{X}_i, e_i)$  is \_\_\_\_ (11) \_\_\_\_ . What is the implication of this result for estimating  $\beta_1$  by least square? \_\_\_\_ (12) \_\_\_\_ .
- Consider a liner model  $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k + u$  where  $u$  is the error term and  $Y$  is either zero or one. If  $\Pr(Y = 1|X) = p$ , then  $Var(Y|X) =$  \_\_\_\_ (13) \_\_\_\_ . What is the implication of this result for the statistical inference on  $\beta_j$ ,  $j = 1, 2, \dots, k$ ? \_\_\_\_ (14) \_\_\_\_ .
- Consider a random sample  $(X_i, u_i)$ ,  $i = 1, 2, \dots, n$ . If  $\bar{X} = (1/n) \sum_{i=1}^n X_i$ ,  $E(X) = \mu_X$ , and  $Var(X) = \sigma_X^2$ , then  $(1/n) \sum_{i=1}^n (X_i - \bar{X})^2 \xrightarrow{p} \text{____ (15) ____}$ . If  $E(u_i|X_i) = 0$  and  $Var(u_i|X_i) < \infty$ , then  $\sqrt{n} (1/n) \sum_{i=1}^n (X_i - \bar{X}) u_i \xrightarrow{d} N(0, V)$  where  $V =$  \_\_\_\_ (16) \_\_\_\_ .
- The table below reports the performance of a model in predicting economic recessions.

	Model Yes	Model No
Actual Yes	10	30
Actual No	10	150

The accuracy rate of this model is \_\_\_\_ (17) \_\_\_\_ , and the coordinate of this result on the ROC curve is \_\_\_\_ (18) \_\_\_\_ .

- Consider a time series model  $Y_t = \phi_1 Y_{t-1} + \phi_2 Y_{t-2} + \epsilon_t$  where  $\epsilon_t$  is white noise with mean zero and variance  $\sigma_\epsilon^2$ . What does it mean if  $\phi_1 + \phi_2 = 1$ ? \_\_\_\_ (19) \_\_\_\_ What is the necessary step before doing the usual statistical analysis for this time series if  $\phi_1 + \phi_2 = 1$ ? \_\_\_\_ (20) \_\_\_\_

備

註

- 一、作答於試題上者，不予計分。  
二、試題請隨卷繳交。