招 生 學 年 度	102	招 生 類 別	碩士班
系 所 班 別	經濟學系碩士班		
科　　　　目	統計學		
注 意 事 項	本考科可使用掌上型計算機		

Your answer must be specific and clear.

1. (13 points) If a fair coin is tossed four times, what is the probability of at least two heads?

2. (13 points) For two random variables, x and y, with variances $\sigma_x^2 = 1$ and $\sigma_y^2 = 2$, what is the variance of the random variable z = 3x − 2y + 5 ?

3. (13 points) School of Social Science has 500 women students and 1,000 men students. The principles of economics class has 90 students, 50 of them are women. It is suspicious that more women tend to take principles of economics class than men. To test this suspicion with the data of this class, what would the null and alternate hypotheses be? Is this a one-sample or a two-sample case?

4. (14 points) To use the t-statistic to test for difference between the means of two populations based on independent samples, what assumptions must be made about the two sampled populations? What assumptions must be made about the two samples?

5. (20 points) Given two variable x and y. There are 10 data points for each x and y. The summary calculations are as follows. Σx=1140, Σx^2=158,400, Σy=236, Σy^2=6,906, Σxy=33,020. For degree of freedom of 9, $t_{0.025}$=2.262, $t_{0.05}$=1.833.
   a. Fit the straight line model through the origin; i.e., fit E(y) =$\beta_1 x$.
   b. Calculate SSE, s^2 and s.
   c. Do the data provide sufficient evidence to indicate that x and y are positively linearly related?
   d. Construct a 95% confidence interval for β_1.

6. (14 points) Indicate whether the following statement is true, false or uncertain. Give a brief explanation or proof. The statement is:
   Suppose that the coefficient of a variable in a regression equation is significantly different from zero at 20% level. If we drop this variable from the regression, both R^2 and $\bar{R}^2$ will necessarily decrease.

7. (13 points) You are given 10 white and 10 black balls and two boxes. You are told that your instructor will draw a ball from one of the two boxes. If it is white, you pass the exam. If it is black, you fail. How should you arrange the balls in the boxes to maximize your chance of passing? Show the calculation of passing probability.