I. Statistics (65%)

1. The weight (in pounds) of the 27 packages of ground beef are listed here in order from smallest to largest:

0.75	0.83	0.87	0.89	0.89	0.89	0.92
0.93	0.96	0.96	0.97	0.98	0.99	1.06
1.08	1.08	1.12	1.12	1.14	1.14	1.17
1.18	1.18	1.24	1.28	1.38	1.41	

(a) Calculate the value of mean and standard deviation. (7%)

(b) The two largest packages of mean weight 1.38 and 1.41 pounds. Are these two packages unusually heavy? Explain. (6%)

2. If four people enter a room, find $P(A)$ and $P(B)$:
   - A. None of these people have the same birthday. (7%)
   - B. At least two of the people have the same birthday. (7%)

3. Suppose that $X_1, X_2, ..., X_n$ and $Y_1, Y_2, ..., Y_n$ are independent random samples from populations with mean μ_1 and μ_2 and variance σ_1^2 and σ_2^2, respectively. Show that $\overline{X} - \overline{Y}$ is a consistent estimator of $\mu_1 - \mu_2$. (12%)

4. The National Fire Incident Report Service stated that, among residential fires, 73% are in family homes, 20% are in apartments, and 7% are in other types of dwellings. If five residential fires are independently reported on a single day, what is the probability that two are in family homes, two are in an apartment, and one is in another type of dwelling? (13%)

5. In an attempt to compare the starting salaries (in thousands) for college graduate who majored in education and the social sciences, random samples of 50 recent college graduates in each major were selected and the following information was obtained:

Major	Mean	SD
Education	27.82	23.42
Social Science	24.52	26.16

Do the data provide sufficient evidence to indicate a difference in average starting salaries for college graduates who major in education and the social sciences? Test using $\alpha = 0.05$ (13%)

注意：背面有試題

II. Basic Econometrics (35%)

1. Assume that the sample variances (and standard deviations) of all the variables in a multiple regression model are identically the same. In this case what is the relationship between the estimated beta coefficients and the standard regression parameters? (6%)

2. "In regression models, the assumption of normality in the population is not important for purposes of estimation, but is crucial for confidence interval construction and for hypothesis testing." True or false? Explain. (6%)

3. "An unbiased estimator is one that closely approximates the parameter." True or false? Explain. (6%)

4. "If X does a good job in explaining variation in Y, then Y will also do a good job in explaining variation in X." True or false? Explain. (6%)

5. In a survey which is relating college grade point average (GPA) to time spend in various activities, the students are asked how many hours they spend each week in four activities: studying, sleeping, working, and leisure. Any activity is put into one of the four categories, so that for each student the sum of hours in activities must be 168. In the regression model

$$GPA = \alpha_0 + \alpha_1 study + \alpha_2 sleep + \alpha_3 work + \alpha_4 leisure + u$$

   (a) Does it make sense to hold *sleep*, *work*, and *leisure* fixed, while changing study? Explain. (5%)
   (b) Can we estimate $\alpha_0, \alpha_1, \alpha_2, \alpha_3, \alpha_4$? Explain. (6%)