所別：產業經濟研究所碩士班 甲組 科目：統計學

注意：請依序橫式作答，未作答題目，請寫題號後空白，未依規定者將予扣分

1. (10%) Suppose that $X_1,....,X_n$ form a random sample from a distribution for which the p.d.f. $f(x\,|\,\theta)$ is as follows:

$$f(x\,|\,\theta) = \begin{cases} \theta x^{\theta-1} & for \quad 0 < x < 1 \\ 0 & otherwise \end{cases}$$

Also, suppose that the value of θ is unknown$(\theta > 0)$. Find the M.L.E. of θ.

2. (20%) (a) Suppose that X has a uniform distribution on the interval (a,b). Determine the moment generating function of X.
(b) Suppose that X is a random variable for which the moment generating function is as follows: $\psi(t) = \frac{1}{4}(3e^t + e^{-t}) \quad for \quad -\infty < t < \infty$.
Find the mean and the variance of X.

3. (10%) A company has come under pressure to eliminate discriminatory hiring practices (all its employees are overseas born women). Company officials have agreed with unions that during the next 5 years, 40% of their new employees will be men and 30% will be Taiwanese born. 35% of new employees, though, will be overseas born women. What percentage of Taiwanese born men are they committed to hire?

4. (20%) A quality control inspection system requires that from each batch of items a sample of 10 is selected and tested. If 2 or more of the sample are defective the whole batch is rejected. If the probability of an item being defective is 0.05

   (a) What is the probability of 2 defectives in the sample?
   (b) What is the probability of the batch being rejected?

   (Note: $0.95^5 = 0.7737$ 、 $0.95^6 = 0.7350$ 、 $0.95^7 = 0.6983$ 、
   $0.95^8 = 0.6634$ 、 $0.95^9 = 0.6302$ 、 $0.95^{10} = 0.5987$)

5. (20%) The following table below shows the probabilities of males (M) and females (F) being employed (E) or unemployed (U) at a poor area in Taiwan.

	M	F
E	0.52	0.41
U	0.05	0.02

   (a) Find P(E|M), the conditional probability of employment given that the person is male
   (b) Find P(M|E), the conditional probability of being male given that the person is employed.

6. (10%) An oil exploration company has a lease for which it must decide to either:

   (a) sell now,

注意：背面有試題

(b) hold for a year and then sell, or
(c) drill now.

The cost of drilling is $200,000.
Drilling will lead to one of the following outcomes:

Well type	Probability	Payoff
Dry	0.5	$0
Wet	0.4	$400,000
Gusher	0.1	$1,500,000

If it sells now, the company can get $125,000. If it holds for a year and oil prices rise (probability =0.6) it can sell for $300,000 or if oil prices fall (probability = 0.4) it can get $100,000.
What should it do?

7. (10%) In a particular university 60% of students are men and 40% are women. In a random sample of 50 students what is the probability that more than half are women?

(Note: $\sqrt{3} = 1.732$; P (z<1.40) = 0.9192 , P(z<1.44) = 0.9251, P(z<1.51)=0.9345, P(z<1.55)=0.9394)