

必要之計算過程均需寫在答案卷上

1. 考慮下列的等候問題。某半自助式家庭理髮有一位理髮師，其顧客的抵達是依據卜瓦松程序 Poisson process 抵達頻率 arrival rate 為  $\lambda$ 。每位顧客的理髮時間為指數分配之隨機變數，其平均時間為  $1/\mu_1$ 。這個家庭理髮有兩個座位，一個供理髮專用，另一個則是作為洗頭專用。洗頭是由顧客自行處理，其時間也是指數分配之隨機變數，平均時間為  $1/\mu_2$ 。新抵達的顧客如果看見理髮師正在為顧客服務則會離開而不會等待。並且顧客在理完頭髮之後將會立即自行洗頭，但是如果看見有其他顧客正在洗頭也會離開而不會等待。將此問題模式化為一等候問題來解。

(a) 定義此一問題的狀態 state，並且依據所定義的狀態空間畫出此等候問題的移轉圖 transition diagram。(10%)

(b) 設  $\lambda = \mu_1 = \mu_2 = 1$ ，求流失之顧客（沒能夠接受理髮但是不含不能洗頭者）的百分比。(10%)

(c) 接著(b)部份計算理完頭髮的顧客可以洗頭的機率為何？(5%)

2.(25%) 考慮下列的遊戲理論 Game Theory 問題。A、B 兩個公司在同一個市場銷售相同功能的產品。由於市場有限，兩公司都相信廣告的重要與影響。以下為兩公司在彼此是否作廣告之下的期望損益表，以百萬元為單位，表中的  $(x, y)$  代表 (A 的收益為  $x$ , B 的收益為  $y$ )。

		B 公司	
		作廣告	不作廣告
A 公司	作廣告	(9, 9)	(13, 6)
	不作廣告	(6, 13)	(8, 8)

由損益表顯示影響兩個公司主要利潤的是彼此的策略。

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八十五學年度研究所碩士班入學考試試題

科目：作業研究

- (i) 試問如果 A 公司採用最小值中取最大值 (maximin) 的決策標準而 B 公司採用最大值中取最大值 (maximax) 的決策標準，則兩公司之廣告決策為何？
- (ii) 假設廣告費用為 3 百萬元，並且列入決策考量。那麼如果 A、B 兩個公司之決策標準維持不變，則兩公司之廣告決策為何？
- (iii) 假設兩個公司訂定合約，彼此保證都不作廣告，違約者將付給對方一筆 3 百萬元罰金（若兩公司都違約或者都不違約則不需付罰金給對方）。當兩公司之決策標準維持不變，則兩公司之廣告決策為何？
3. (1) Please describe three major causes which may lead to the failure of an Operations Research study in real world problems. (9%)
- (2) List four major advantages of using mathematical models instead of a verbal description of the problems. (8%)
- (3) List at least four major steps of an Operations Research study. (8%)
4. A company is deciding to build a nuclear plant at Site A or at Site B. The cost of building the power plant is \$10 million at Site A and \$20 million at Site B. If the company builds at Site A, however, and an earthquake occurs at Site A during the next five years, construction will be terminated and the company will lose \$10 million (and will still have to build a power plant at Site B). The company believes there is a 20% chance that an earthquake will occur at Site A during the next five years. For \$1 million, a geologist can be hired to analyze the fault structure at Site A. He will either predict that an earthquake will occur or that an earthquake will not occur. The geologist's past record indicates that he will predict an earthquake on 95% of the occasions for which an earthquake will occur and no earthquake on 90% of the occasions for which an earthquake will not occur.
- (1) What is the expected value of perfect information regarding the occurrence of the earthquake? (5%)
- (2) What is the expected value of hiring the geologist? (5%)
- (3) Draw the decision tree to show the decision procedure. (10%)
- (4) What decision strategy should the company adopt (according to the Bayes' rule)? (5%)

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科目：生產管理

1. Describe the similarities and differences (including the advantages and disadvantages) between the following two forecasting methods: exponential smoothing and moving average. (25%)
2. Tony is considering starting a sandwich-making business from his dormitory room in order to earn some extra income. However, he has only a limited budget of \$100 to make his initial purchases. Tony divides his needs into three areas: breads, meats and cheeses, and condiments. The demand and cost parameters are given below.

	<i>Breads</i>	<i>Meats and Cheeses</i>	<i>Condiments</i>
Weekly demand	6 packages	10 packages	3 pounds
Cost per unit	\$0.65	\$3.0	\$1.5
Fixed order cost	\$10	\$12	\$8

The choice of these fixed costs are based on the fact that these items are purchased at different locations in town. Assume that holding costs are based on annual interest rate of 25 percent. (25%)

- a. Find the optimal quantity that Tony should purchase of each type of product so that he does not exceed the budget. (13%)
- b. If Tony could purchase all the items at the same location and assume fixed order cost is \$12, would that alter your solution? Why? (12%)
3. Consider the following time-phased net requirements from MRP record. (25%)

<i>Period</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>
Requirements	16	12	35	30	8	18

Assume ordering cost is \$5 per order, carrying cost is \$0.1 per unit per period, and purchase price is \$1.

- a. Decide the ordering pattern using Least Unit Cost (LUC) procedures. (13%)
- b. If a quantity discount of \$0.1 per unit is given for orders of more than 50 units, what will be the order pattern? (Assume the requirements of a period can not be split) (12%)

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4. A company has five orders to be produced. Each order consists of two tasks : A and B. For each order, task B can not start until task A is completed. Given the operation times required of each task in the following table. (25%)

Orders	Task A (hours)	Task B (hours)
1	2	7
2	5	6
3	5	3
4	8	4
5	2	1

- What schedule produces the shortest time span in which these orders can be completed? (5%)
- How many hours does it take to complete the five orders? (5%)
- For the schedule in question (a), how many idle hours generated from the machine forming task A? (5%)
- What is the average order completion time? (5%)
- What is the average number of order in the system? (5%)



解答時，必要之計算或推導過程均需顯示在答案卷上，祝各位成功。

1.(10%) 求下列各曲面或平面所圍成封閉形狀之體積。  
 $z = x + y + 1$ ;  $z = 0$ ;  $x + y = 1$ ;  $x = 0$ ;  $y = 0$

2.(10%) 求下列各曲面或平面所圍成封閉形狀之面積，

$$xy = a^2, \quad x + y = \frac{5a}{2}, \quad (a > 0),$$

並在X-Y座標上約略繪出此封閉區域之圖形。

3.(10%) 若函數  $f(x, y) = \sqrt{\sin(x^2 + y^2)}$  存在 (即有定義)，試列出  $f(x, y)$  存在領域之方程式，以及在X-Y座標上約略繪出存在領域之圖形。

4.(10%) 已知  $y$  為  $x$  之函數，即  $y = y(x)$ ，且  $x^2 - xy + y^2 = 1$ ，又若

$$y \text{ 的二階微分 } y'' \text{ 可表示成 } y'' = \frac{A}{B} \text{ 之形式，}$$

求  $A = ?$ ,  $B = ?$

5.(10%) 若  $\int_0^x f(t) dt = x \cdot f(\theta x)$ ，其中  $f(t) = e^t$ ，則

$$(a) \theta = ?$$

$$(b) \lim_{x \rightarrow 0} \theta = ?$$

6.(10%) 若  $\sum_{n=0}^{\infty} \frac{z^n}{n!} = e^z$ ，試導出  $\sum_{n=0}^{\infty} \frac{\sin nx}{n!} = ?$



- 7.(10%) 試求一非奇異 (non-singular) 矩陣  $P$  和一對角線 (diagonal) 矩陣  $D$ , 使  $A$  與  $D$  相似 (similar), 其中

$$A = \begin{bmatrix} -1 & -4 & -8 \\ -4 & -7 & 4 \\ -8 & 4 & -1 \end{bmatrix}$$

- 8.(10%) 若三階 ( $3 \times 3$ ) 方陣  $A$  的特徵多項式 (characteristic polynomial) 為  $P(\lambda) = -\lambda^3 + \lambda^2 + 14\lambda - 24$ , (a) 試問  $A$  是否可對角化 (diagonalizable)? 理由為何? (b) 試求  $(A^3 - A^2 - 14A)^{-1}$  的值.

- 9.(10%) 令  $S = \{(x, y) | xy = 1\}$ , 而線性映射  $T: \mathbb{R}^2 \rightarrow \mathbb{R}^2$  定義為  $T(x, y) = (x+y, 2x-y)$ . (a) 求  $S$  經過  $T$  的映像 (direct image)  $T(S)$  的方程式. (b) 若利用座標旋轉將 (a) 所得的方程式簡化為  $Ax^2 + By^2 = 1$ , 試求  $A$  與  $B$  之值.

- 10.(10%) 已知線性變換  $AX = \lambda X$ , 其中  $A = [a_{ij}]_{n \times n}$ ,  $X$  為非零向

量. 假定  $a_{ii} = 1, \forall i$ , 試證明  $\sum_{i=1}^n \lambda_i = n$ .



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科目：工程數學

\*必要之計算過程均須寫在答案卷上，僅寫答案者不予計分。

1.(20%) a) 試證下述微分方程式  $\frac{d^2x}{dt^2} + \omega^2x = F_0 \sin \gamma t$  ;  $x(0) = 0, \left. \frac{dx}{dt} \right|_{t=0} = 0$

之解為  $x(t) = \frac{F_0}{\omega(\omega^2 - \gamma^2)} (-\gamma \sin \omega t + \omega \sin \gamma t)$  。 (7%)

b) 評估  $\lim_{\gamma \rightarrow \omega} \frac{F_0}{\omega(\omega^2 - \gamma^2)} (-\gamma \sin \omega t + \omega \sin \gamma t)$  之值。 (7%)

c) 若上述微分方程式之型式變為  $\frac{d^2x}{dt^2} + 2\lambda \frac{dx}{dt} + \omega^2x = F_0 \sin \gamma t$  ,  
則其解之特性有何明顯的變化? (6%)

2.(10%) 試透過泰勒(Taylor)級數展開將  $x = x_n$  處之一次導數  $y'(x_n)$  及二次導數  $y''(x_n)$  以  $y(x_n)$  及鄰近點之函數值  $y(x_n \pm h)$  來表示。(省略所有高次導數項)

3.(10%) a) 何謂偶函數(even function)與奇函數(odd function)? (4%)

b) 試決定同時為偶函數與奇函數的函數型式。(3%)

c) 當函數為偶函數或奇函數時，積分  $\int_{-a}^a f(x) dx$  各可如何化簡? (3%)

4.(10%) 現有一圓柱型容器，其體積可由  $V = \pi r^2 h - \pi s^2 h$  來計算。而  $r, s$  分別為該容器之外、內徑， $h$  則為容器高度。若  $r, s$  之量測誤差各為 +3%，而  $h$  之誤差則為  $\pm 1\%$ ，試計算體積  $V$  之可能誤差範圍。  
(提示：考慮函數之 total differential)

5.(5%) 使用 Gauss-Jordan elimination 消去法解下列的線性系統

$$4X_1 + 2X_2 - 7X_3 = 1$$

$$2X_1 - 3X_2 + 1X_3 = -3$$

$$1X_1 + 2X_2 - 4X_3 = 1$$

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科目：工程數學

(5%) 為下列正矩陣 square matrix  $A$ ，計算  $A^5$  的 determinant

$$A = \begin{bmatrix} 2 & 0 & 0 \\ 4 & 1 & 0 \\ 1 & 4 & 2 \end{bmatrix}$$

7. (10%) 正矩陣 square matrix  $A$ ，如果有  $A^T = A$  則稱  $A$  為對稱 symmetric，並且如果  $A^T = -A$  則稱之為 skew-symmetric。令  $B$  為任一正矩陣 square matrix，下列何者為 skew-symmetric? 證明之。

(a)  $BB^T$

(b)  $B - B^T$

(c)  $B + B^T$

8. (10%) 計算下列矩陣  $A$  的特徵值 eigenvalue 與各特徵值所對應的特徵向量 eigenvector。

$$A = \begin{bmatrix} 0 & 0 & -2 \\ 1 & 2 & 1 \\ 1 & 0 & 3 \end{bmatrix}$$

9. (10%) 為下列線性系統  $Ax = b$  計算其最小平方解

$$X_1 - X_2 = 3$$

$$X_1 + X_2 = -2$$

$$X_2 = 1$$

10. (10%) 計算在三維空間 3-space 中通過  $(1, 1, 2)$ ,  $(-1, 1, -2)$ ,  $(0, 2, 1)$  這三個點的平面  $ax + by + cz = 1$  之  $a, b, c$  值。並計算由空間中  $(2, 4, 1)$  這一點到此平面的最短距離 (distance)  $D$ 。



1. (10%) Roll a fair 4-sided die twice. Let  $X$  denote the outcome on the first roll, and let  $Y$  be the sum of two rolls. Find

- (a) means and variances of  $X$  and  $Y$ ; (5%)  
 (b) covariance and correlation coefficient of  $X$  and  $Y$ . (5%)

2. (10%) The life time,  $X$ , of a certain electric component is a random variable with density function

$$f(x) = (1/100) e^{-x/100}, \quad \text{for } x > 0.$$

Three of these components operate independently in a piece of equipment. The equipment fails if at least two of the components fail. Find the probability that the equipment operates for at least 200 hours without failure.

3. (10%) Observations in an interested population are Bernoulli random variables with  $p = 1/3$ . Four observations are sampled and denoted by  $X_1, X_2, X_3$  and  $X_4$ .

- (a) Find the sampling distribution of the sample variance  $S^2$ . (5%)  
 (b) Compute  $E(S^2)$ . (5%)

4. (10%) Let  $Y_1$  and  $Y_2$  have the joint probability density function given by

$$f(y_1, y_2) = k y_1 y_2, \quad \text{for } 0 < y_1 < 1, 0 < y_2 < 1.$$

- (a) What is the value of  $k$ ? (3%)  
 (b) Find the marginal densities of  $Y_1$  and  $Y_2$ . (3%)  
 (c) Find the probability  $P(Y_1 < 0.5, Y_2 < 0.75)$ . (2%)  
 (d) Find the probability  $P(Y_1 < 0.5 \mid Y_2 < 0.75)$ . (2%)

5. (10%) Let  $X$  have a logistic distribution with probability density function

$$f(x) = e^{-x} / (1 + e^{-x})^2, \quad -\infty < x < \infty.$$

Show that  $Y = 1 / (1 + e^{-x})$  has a uniform(0,1) distribution.

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科目：機率與統計

6. (10%) A local bank is reviewing its credit card policy with a view toward recalling some of its credit cards. In the past approximately 5% of cardholders have defaulted, and the bank has been unable to collect the outstanding balance. Thus management has established a prior probability of .05 that any particular cardholder will default. The bank has further found that the probability of missing one or more monthly payments for those customers who do not default is .20. Of course the probability of missing one or more payments for those who default is 1.
- Given that a customer has missed a monthly payment, compute the posterior probability that the customer will default. (5%)
  - The bank would like to recall its card if the probability that a customer will default is greater than .20. Should the bank recall its card if the customer missing a monthly payment? Why or why not? (5%)
7. (10%) In making bids on building projects, Sonneborn Builders, Inc. assumes construction workers are idle no more than 15% of the time. For a normal 8-hour shift, this means that the mean idle time per worker should be .72 minutes or less per day. A sample of 30 construction workers provided a mean idle time of 80 minutes per day. The sample standard deviation was 20 minutes. Suppose a hypothesis test is to be designed to test the validity of the company's assumption.
- What is the  $p$ -value associated with the sample result? (5%)
  - Using a .05 level of significance and the  $p$ -value, test the hypothesis  $H_0: \mu \leq 72$ . What is your conclusion? (5%)
8. (10%) Refer again to question 2.
- What is the probability of making a Type II error when the population mean idle time is 80 minutes? (3%)
  - What is the probability of making a Type II error when the population mean idle time is 75 minutes? (3%)
  - What is the probability of making a Type II error when the population mean idle time is 70 minutes? (2%)
  - Sketch the power curve for this problem. (2%)



9. (10%) A company attempts to evaluate the potential for a new bonus plan by selecting a random sample of 5 salespersons to use the bonus plan for a trial periods. The weekly sales volumes before and after implementing the bonus plan are shown below:

Salesperson	Weekly Sales Before	Weekly Sales After
1	15	18
2	12	14
3	18	19
4	15	18
5	16	18

- a. Use  $\alpha = .05$  and test to see if the bonus plan will result in an increase in the mean weekly sales. (5%)
- b. Provide a 90% confidence interval estimate for the mean increase in weekly sales that can be expected if a new bonus plan is implemented. (5%)

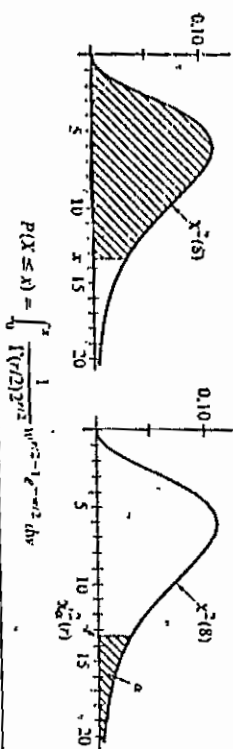
10. (10%) A salesperson makes four calls per day. A sample of 100 days shows the following frequencies of sales volumes:

Number of Sales	Observed Frequency (days)
0	30
1	32
2	25
3	10
4	3
	100

Assume the population is a binomial distribution with a probability of purchase equal to  $p = .30$ . Should the assumption of a binomial distribution be rejected? Why or why not? Use  $\alpha = .05$ .

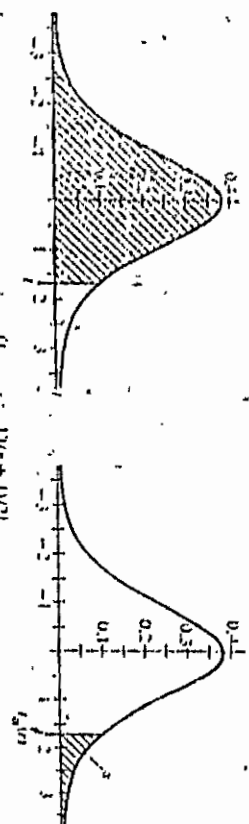
# 机率与统计之附件 1

The Chi-Square Distribution



$r$	$\chi^2_{0.10}(r)$	$\chi^2_{0.05}(r)$	$\chi^2_{0.025}(r)$	$\chi^2_{0.01}(r)$	$\chi^2_{0.90}(r)$	$\chi^2_{0.95}(r)$	$\chi^2_{0.975}(r)$	$\chi^2_{0.990}(r)$
1	0.000	0.001	0.004	0.016	2.706	3.841	5.024	6.635
2	0.020	0.051	0.103	0.211	4.605	5.991	7.378	9.210
3	0.015	0.115	0.352	0.584	6.251	7.815	9.348	11.34
4	0.297	0.484	0.711	1.064	7.779	9.488	11.14	13.28
5	0.554	0.831	1.145	1.610	9.236	11.07	12.83	15.09
6	0.577	1.237	1.635	2.204	10.64	12.59	14.45	16.81
7	1.239	1.690	2.167	2.833	12.02	14.07	16.01	18.48
8	1.656	2.180	2.733	3.490	13.36	15.51	17.54	20.09
9	2.088	2.700	3.325	4.168	14.68	16.92	19.02	21.67
10	2.558	3.247	3.940	4.865	15.99	18.31	20.48	23.21
11	3.053	3.816	4.575	5.578	17.28	19.68	21.92	24.72
12	3.571	4.404	5.226	6.304	18.55	21.03	23.34	26.22
13	4.107	5.009	5.892	7.042	19.81	22.36	24.74	27.69
14	4.660	5.629	6.571	7.790	21.06	23.68	26.12	29.14
15	5.229	6.252	7.261	8.547	22.31	25.00	27.49	30.58
16	5.812	6.908	7.962	9.312	23.54	26.30	28.84	32.00
17	6.408	7.594	8.672	10.08	24.77	27.59	30.19	33.41
18	7.015	8.231	9.390	10.85	25.99	28.87	31.53	34.80
19	7.633	8.907	10.12	11.65	27.20	30.14	32.85	36.19
20	8.250	9.591	10.85	12.44	28.41	31.41	34.17	37.57
21	8.897	10.28	11.59	13.24	29.62	32.67	35.48	38.93
22	9.542	10.98	12.34	14.04	30.81	33.92	36.78	40.29
23	10.20	11.69	13.09	14.85	32.01	35.17	38.08	41.64
24	10.86	12.40	13.85	15.66	33.20	36.42	39.36	42.98
25	11.52	13.12	14.61	16.47	34.38	37.65	40.65	44.31
26	12.20	13.84	15.38	17.29	35.56	38.88	41.92	45.64
27	12.88	14.57	16.15	18.11	36.74	40.11	43.19	46.96
28	13.56	15.31	16.93	18.93	37.92	41.34	44.46	48.28
29	14.25	16.05	17.71	19.77	39.09	42.56	45.72	49.59
30	14.95	16.79	18.49	20.61	40.26	43.78	46.98	50.89
31	15.65	17.53	19.27	21.45	41.43	45.00	48.24	52.19
32	16.36	18.27	20.05	22.29	42.60	46.21	49.49	53.48
33	17.07	19.01	20.83	23.13	43.77	47.42	50.75	54.78
34	17.79	19.75	21.61	23.97	44.94	48.63	51.99	56.07
35	18.51	20.49	22.39	24.81	46.11	49.84	53.24	57.36
36	19.23	21.23	23.17	25.65	47.28	51.05	54.48	58.65

The t Distribution



$r$	$t_{0.10}(r)$	$t_{0.05}(r)$	$t_{0.025}(r)$	$t_{0.01}(r)$	$t_{0.90}(r)$	$t_{0.95}(r)$	$t_{0.975}(r)$	$t_{0.990}(r)$
1	0.335	1.000	3.078	6.314	12.706	21.821	63.657	63.657
2	0.289	0.816	1.886	2.930	4.503	6.965	9.925	9.925
3	0.277	0.765	1.638	2.353	3.182	4.541	5.841	5.841
4	0.271	0.741	1.533	2.132	2.776	3.747	4.604	4.604
5	0.267	0.727	1.476	2.015	2.571	3.365	4.032	4.032
6	0.265	0.718	1.440	1.943	2.447	3.143	3.707	3.707
7	0.264	0.711	1.415	1.895	2.365	2.998	3.499	3.499
8	0.263	0.706	1.397	1.860	2.306	2.896	3.355	3.355
9	0.262	0.703	1.383	1.833	2.262	2.821	3.250	3.250
10	0.261	0.700	1.372	1.812	2.228	2.764	3.169	3.169
11	0.260	0.697	1.363	1.796	2.201	2.718	3.106	3.106
12	0.259	0.695	1.356	1.782	2.179	2.681	3.055	3.055
13	0.258	0.694	1.350	1.771	2.160	2.650	3.012	3.012
14	0.258	0.692	1.345	1.761	2.145	2.624	2.977	2.977
15	0.258	0.691	1.341	1.753	2.131	2.602	2.947	2.947
16	0.258	0.690	1.337	1.746	2.120	2.583	2.921	2.921
17	0.257	0.689	1.333	1.740	2.110	2.567	2.898	2.898
18	0.257	0.688	1.330	1.735	2.101	2.552	2.878	2.878
19	0.257	0.688	1.328	1.729	2.093	2.539	2.861	2.861
20	0.257	0.687	1.325	1.725	2.086	2.528	2.845	2.845
21	0.257	0.686	1.323	1.721	2.080	2.518	2.831	2.831
22	0.256	0.686	1.321	1.717	2.074	2.508	2.819	2.819
23	0.256	0.685	1.319	1.714	2.069	2.500	2.807	2.807
24	0.256	0.685	1.318	1.711	2.064	2.492	2.797	2.797
25	0.256	0.684	1.316	1.708	2.060	2.485	2.787	2.787
26	0.256	0.684	1.315	1.706	2.056	2.479	2.779	2.779
27	0.256	0.684	1.314	1.703	2.052	2.475	2.771	2.771
28	0.256	0.683	1.313	1.701	2.048	2.467	2.763	2.763
29	0.256	0.683	1.311	1.699	2.045	2.462	2.756	2.756
30	0.256	0.683	1.310	1.697	2.042	2.457	2.750	2.750
31	0.255	0.682	1.309	1.695	2.040	2.452	2.745	2.745
32	0.255	0.682	1.308	1.694	2.038	2.448	2.740	2.740
33	0.255	0.682	1.307	1.693	2.036	2.444	2.736	2.736





國立雲林技術學院

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八十五學年度研究所碩士班入學考試試題

科目：經濟學

## Macroeconomics

Please answer the following questions briefly but pointedly, each question is 5 points.  
Good Luck !

1. What will happen if the level of real output is greater than the natural level of real output ?
2. If nominal GDP in year 2 is \$3.4 billion and the inflation rate, as measured by the implicit GDP deflator, is 3.03 percent from year 1 to year 2, what is real GDP for year 2 measured in year 1 prices ?
3. What is the relationship between interest rates and bond prices ? How does this relationship correspond to the theory of money demand ?
4. Explain the role of automatic stabilization in determining government budget deficit.
5. What will happen to the short-run aggregate supply curve if a fall in nominal wages occurs ?
6. What are the similarities between Lucas model and the real business cycle model ?
7. Is it possible for the real rate of interest to rise while the nominal interest rate falls ?
8. An increase in immigration would affect the growth rate of real GDP per person in which way ?
9. What does the purchasing-power-parity condition imply about exchange rate ?
10. What are the lags involved in the implementation of monetary policy ?



II. Microeconomics: multiple choice (2.5 points each question).

1. John must pay \$6 each for punk rock video cassettes. If John is paid \$48 per sack for accepting garbage and if his relatives send him an allowance of \$384, then his budget line is described by the equation (V: the amount of video cassettes, G: the amount of garbage):

- (a)  $6V=48G$
- (b)  $6V+48G=384$
- (c)  $6V-48G=384$
- (d)  $6V=384-G$

2. A college football coach says that given any two linemen A and B, he always prefers the one who is bigger and faster. This preference relation is

- (a) transitive
- (b) complete
- (c) both transitive and complete
- (d) neither transitive nor complete

3. If good 1 is a "neutral," what is its marginal rate substitution for good 2?

- (a) 0
- (b) infinite
- (c) 1
- (d) -1

4. John thinks that 2 units of good 1 is always a perfect substitute for 3 units of good 2. Which of the following utility functions is the only one that would NOT represent John's preferences?

- (a)  $U(x_1, x_2) = 3x_1 + 2x_2 + 1000$
- (b)  $U(x_1, x_2) = 9x_1^2 + 12x_1x_2 + 4x_2^2$
- (c)  $U(x_1, x_2) = \min(3x_1, 2x_2)$
- (d)  $U(x_1, x_2) = 30x_1 + 20x_2 - 10,000$

5. Suppose that a consumer always consumes 2 spoons of sugar with each cup of coffee. If the price of sugar is  $p_1$  per spoonful and the price of coffee is  $p_2$  per cup and the consumer has  $m$  dollars to spend on coffee and sugar, how much coffee will he want to purchase?

- (a)  $\frac{m}{2p_1 + p_2}$
- (b)  $\frac{m}{p_1 + 2p_2}$
- (c)  $\frac{2m}{p_1 + p_2}$
- (d)  $\frac{m}{2p_2}$

6. Suppose Elmer's utility function is  $U(x, y) = \min\{x, y^2\}$ . If the price of  $x$  is 15, the price of  $y$  is 10, and Elmer chooses to consume 7 units of  $y$ , what must Elmer's income be?

- (a) 1610
- (b) 175
- (c) 915
- (d) 805



7. Suppose that John's utility function is  $3x+y$ , where  $x$  is his consumption of cocoa and  $y$  is his consumption of cheese. If the total cost of  $x$  units of cocoa is  $x^2$ , if the price of cheese is 8, and John's income is \$174, how many units of cocoa will he consume?

- (a) 9
- (b) 12
- (c) 23
- (d) 11

8. Suppose that Ms. Lynch can make up her portfolio using a risk-free asset with rate of return of 15% and a risky asset with expected rate of return 30%, with standard deviation 5. If she chooses a portfolio with expected rate of return 18.75%, then the standard deviation of her return on this portfolio will be

- (a) 0.63%
- (b) 4.25%
- (c) 1.25%
- (d) 2.50%

9. Sir Plus has a demand function for oranges that is given by  $D(p)=100-p$ . If the price of oranges is 75, how much is Sir Plus's net consumer surplus?

- (a) 312.50
- (b) 25
- (c) 625
- (d) 156.25

10. Suppose the demand function of oranges is  $D(p)=(p+1)^{-2}$ . If the price of oranges is 10, then the price elasticity of demand is

- (a) -7.27
- (b) -3.64
- (c) -5.45
- (d) -1.82

11. If  $S(p)=12-2p$ , what price will maximize revenue?

- (a) 2
- (b) 3
- (c) 4
- (d) 5

12. Here are the supply and demand equations for oranges, where  $p$  is the price in dollars:

$$S(p)=10+p; D(p)=40-p.$$

Suppose that the government decides to restrict the industry to selling only 20 oranges. At what price would the suppliers supply only 20 units?

- (a) 10 (b) 20 (c) 30 (d) 40

13. The technical rate of substitution between factors  $x_2$  and  $x_1$  is -4. If you desire to produce the same amount of output but cut your use of  $x_1$  by 3 units, how many more units of  $x_2$  will you need?

- (a) 10 units (b) 8 units (c) 6 units (d) 12 units





14. Suppose that the production function is  $f(x_1, x_2) = (x_1^a + x_2^a)^b$ , where  $a$  and  $b$  are positive constants. For what positive values of  $a$  and  $b$  are there decreasing returns to scale?
- (a)  $ab > 1$   
(b)  $ab < 1$   
(c)  $a+b = 1$   
(d)  $a+b > 2$
15. Given the production function as  $f(x) = 4\sqrt{x}$ , where  $x$  is the number of units of input. The commodity sells for \$100 per unit. The input costs \$50 per unit. How much profits does it make when it maximizes profits?
- (a) 1000  
(b) 1200  
(c) 800  
(d) 1100
16. Given the production function as  $f(x_1, x_2) = x_1^{0.5}x_2^{0.5}$ . If the price of factor 1 is 8 and the price of factor 2 is 16, in what proportions should the firm use factors 1 and 2 if it wants to maximize profits?
- (a)  $x_1 = x_2$   
(b)  $x_1 = 0.5x_2$   
(c)  $x_1 = 2x_2$   
(d)  $4x_1 = x_2$
17. Given the production function as  $f(L, K) = 4L^{0.5}K^{0.5}$ , where  $L$  is the number of units of labor and  $k$  is the number of machines used. If the cost of labor is \$25 per unit and the cost of machines is \$64 per unit, then the total cost of producing 6 units of output will be
- (a) 120  
(b) 267  
(c) 150  
(d) 240
18. Which of the following is false?
- (a) Average fixed costs never increase with output.  
(b) Average total cost are always greater than or equal to average variable costs.  
(c) Average cost can never rise while marginal costs are declining.  
(d) The area under the marginal cost curve measures the variable costs.
19. A firm has a cost function given by  $c(y) = 10y^2 + 1000$ . At what output is average cost minimized?
- (a) 15 (b) 10 (c) 20 (d) 18
20. Suppose that a monopolist faces two markets with demand curves given by  $D_1(p_1) = 100 - p_1$ ;  $D_2(p_2) = 100 - 2p_2$ . Assume that the monopolist's marginal cost is constant at \$20 a unit. What price should it charge if it can't price discriminate?
- (a)  $p = 45\frac{1}{3}$  (b)  $p = 43\frac{1}{3}$  (c)  $p = 42.5$  (d)  $p = 41$

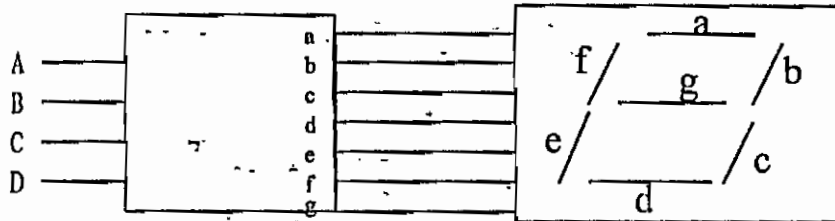
國立雲林技術學院

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八十五學年度研究所碩士班入學考試試題 一科目：計算機概論

共10題,每題10分.

1. 如下圖, 假設七段顯示器以high 電位驅動



- (a) 畫出輸出C 與輸入 A, B, C, D 之真值表 (4分)
  - (b) 化簡  $\bar{C}$  (3分)
  - (c) 畫出線路圖 (3分)
2. 盡你所能說明任何一種你所熟知的視覺環境如 Visual-Basic、Visual-C++、Delphi、Visual-Age所提供之再使用軟體類別庫架構。
  3. 以圖解分別畫出 cpu, system bus, DMA controller, peripheral device, 及相關控制線以說明DMA 之動作原理。
  4. 舉 Windows-31 及 Windows-95 之應用系統為例, 解釋 preempty 及 nonpreempty 之 Cpu 排班法則之差異。
  5. 說明傳統分封交換網路 (如x.25) 與快速分封交換網路 Frame-relay 及 Cell-relay 之主要差異。
  6. IBM PC 電腦開機程序中, 會啓動那些檔案? 試說明這些檔案啓動之先後次序. (ex: AUTOEXEC.BAT, CONFIG.SYS, ...)
  7. 電腦病毒之分類為何? 通常電腦病毒會被發現隱藏於那些區域?
  8. 依組織型態分類, 資料庫可分為那三類? 試比較其優缺點。
  9. 何謂 AVL 高度平衡樹? node=15 之高度平衡樹, 在搜尋過程中, 最多需比較幾次?
  10. 何謂 cache memory? 其address mapping 之方式有那些, 試詳述之。