國立雲林技術學院
八十六學年度研究所碩士班入學考試試題

所別：工業工程與管理技術研究所
科目：作業研究

必要之計算過程均需寫在答案卷上

1. (i) (6%) Describe three important properties of the exponential distribution and state why they are important for queueing theory and the implications.

   (ii) (9%) Consider the M/G/1 queueing model. That is, interarrival time is an exponential distribution, and service time is a general distribution (G). Discuss the influence of the service time distribution (G) on the expected waiting time of a customer. (Hint: $Lq=(\lambda^2\sigma^2+\rho^2)/2(1-\rho)$, where Lq is the average length of the queue, and σ^2 is the variance of G ; $\rho=\lambda/\mu<1$, $\lambda=$ mean arrival rate, $\mu=$ mean service rate). Discuss the implications of these findings for hiring employees as servers in the system if the M/G/1 is an appropriate model.

   (iii) (10%) Prove the **Rate-In=Rate-Out** principle in the birth-and-death process of a queueing model. Use this principle to derive the balance equations of the M/M/1 model.

2. Queen Cosmetics (QC) produces Leslie Perfume, which requires chemicals and labor. Two production processes are available: Process 1 transforms 1 unit of labor and 2 units of chemicals into 3 oz of perfume. Process 2 transforms 2 units of labor and 3 units of chemicals into 5 oz of perfume. It costs QC \$3 to purchase a unit of labor and\$2 to purchase a unit of chemicals. Each year, up to 20,000 units of labor and 35,000 units of chemicals can be purchased. In the absence of advertising, QC believes it can sell 1000 oz of perfume. To stimulate demand for Leslie, QC can hire the lovely model Jenny Nelson. Jenny is paid \$100/hour. Each hour Jenny works for the company is estimated to increase the demand for Leslie Perfume by 200 oz. Each ounce of Leslie Perfume sells for \$5.

   (i) (13%) Formulate the linear programming model to determine how QC can maximize profits. (DO NOT SOLVE).

   (ii) (12%) List at least four assumptions of this linear programming formulation as a representation of the real problem, and discuss in what conditions these assumptions may be violated.

國立雲林技術學院
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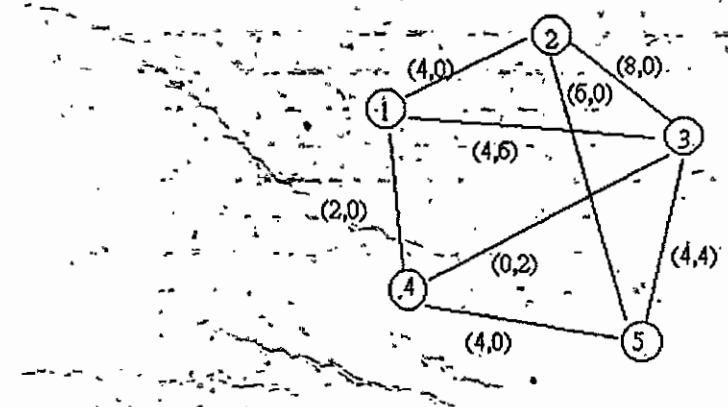
3. (25%) 考慮下列的運輸問題Transportation Problem。此問題中三個供應點的供給量分別為10、80、15單位。三個需求點的需求量分別為75、20、50單位。其間的運輸成本如下表中所示，例如供應點3至需求點1的運輸成本為每單位3元，注意總需求超過總供應。

		Demand			
		1	2	3	s_i
Supply	1	5	1	7	10
	2	6	4	6	80
	3	3	2	5	15
	d_j	75	20	50	

(i) (10%) 假設需求點1、2、和3未被滿足的需求每單位分別有5、3、及2元的罰款，找出最佳解。

(ii) (15%) 假設未被滿足的需求沒有罰款，但是需求點3的需求量必須完全被滿足，計算其最佳解。

4. (25%)考慮下列網路的最大流通問題Maximum Flow Problem：兩個節點 node 間連結的指標 arc 上括號內的數據代表可運送的單位數。例如節點1和節點3的指標上為 (4, 6) 代表從節點1可送4單位到節點3，而節點3則可送6單位到節點1。令 x_{ij} 為節點 i 至節點j 的流通量。



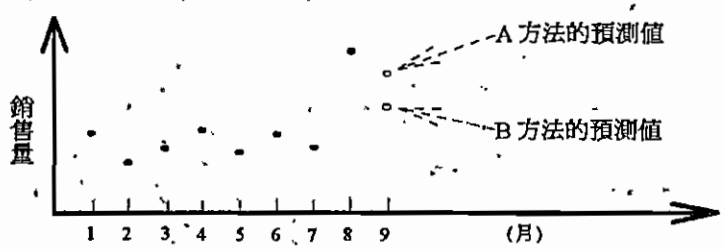
(i) (15%) 試決定從節點1可送到節點5的最大流通量。必須列出 x_{ij} 解以及必要過程。

(ii) (10%) 將最小切割 Minimum Cut 以圖形標示出來並寫下所包含的指標arc。

國立雲林技術學院
八十六學年度研究所碩士班入學考試試題

所別：工業工程與管理技術研究所
科目：生產管理

1. 某製造公司過去一月至八月的銷售量標示如圖一，其中八月的銷售量顯著上升。目前有A與B兩種預測方法可以做選擇，以A與B兩種預測方法分別針對第九月份做銷售量預測，其預測值亦分別標示於圖一最右邊。請簡答下列四小題：(每小題均為5分，共計20分)



圖一

(a) 若A與B均為Simple Moving Average方法($F_t = (\sum_{i=1}^{n} A_{t-i})/n$)，則A與B之$n$值何者較大？

(b) 若A與B均為Weighted Moving Average方法($F_t = W_1 A_{t-1} + W_2 A_{t-2}$)，則A與B之$W_2$值何者較大？

(c) 若A與B均為Single Exponential Smoothing方法，則A與B之平滑係數(α值)何者較大？

(d) 試比較A、B兩種預測方法的優劣之處，並說明這兩種預測方法的適用對象分別為何。

2. 某便利超商以隨機方式抽樣記錄每日的報紙需求量，表一所示為15天的統計資料。該便利超商每份報紙的進貨成本為$7、每份售價為$15。若當天報紙無法賣完則以廢紙價出售每份$2。(四小題共計30分)

表一

日期	需求數量	日期	需求數量	日期	需求數量
3/02	75	4/06	90	5/01	80
3/05	85	4/09	95	5/07	90
3/15	80	4/14	75	5/15	85
3/16	75	4/19	95	5/23	80
3/21	90	4/28	85	5/29	95

(a) 請參考表一的資料，以不連續存貨水準(Discrete Stocking Levels)方式，決定該便利超商每日報紙的進貨量。(10分)

(b) 若以連續存貨水準(Continuous Stocking Levels)方式，假設每日報紙需求數量在75份至95份之間呈Uniform Distribution，決定該便利超商每日報紙的進貨量。(10分)

(c) 表一中的『需求數量』是否即為銷售數量？應如何搜集該項資料？(5分)

(d) 試比較單期存貨模式、經濟訂購批量模式、與定期訂購模式三者的差異。(5分)

國立雲林技術學院
八十六學年度研究所碩士班入學考試試題

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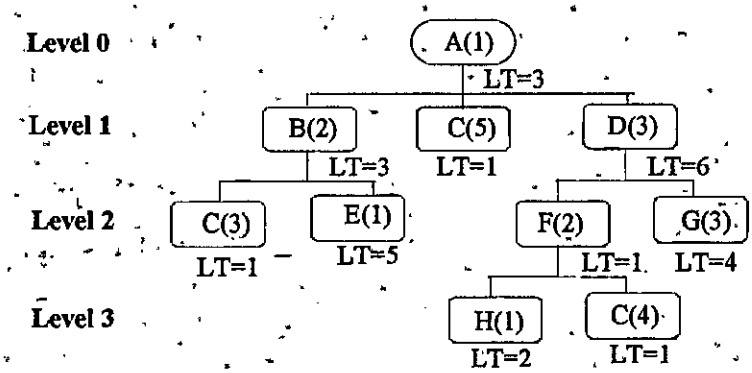
3. 某產品之結構圖(BOM)如圖二所示：大寫字母為材料名稱，( )內表示每單位用量，製造或採購的前置期(LT)以週為單位。(五小題共計20分)



圖二

(a) 若要完成十個成品，則需多少個C材料？(3分)
(b) 依照該產品之結構圖，估算MRP至少應含蓋的週數？(3分)
(c) 依照Low Level Coding觀念，重新劃該產品之結構圖？(4分)
(d) 若經MRP展開後，已知某Level 3之外購材料其淨需求量由第一週至第六週依序分別為：8, 10, 12, 10, 14, 6，且該材料Ordering Cost為20.0 $/次，每單位的Holding Cost為1.0 $/週。請依照Part Period Method決定每次的採購批量及每批材料之購入時間。(5分)
(e) 以(d)小題的成本資料，比較Part Period Method與Lot-for-Lot兩種採購方式，何者總成本較低？(5分)

4. 簡答下列各題：(四小題共計30分)
(a) 比較Product-Focused與Process-Focused兩種製程安排。逐一比較兩者之一般特性、適用狀況、產品種類與批量大小、訂單安排、現場管理狀況、機器設備狀況、作業人員技術水準等特徵或優劣之處。(10分)
(b) 定義及說明四種評估生產排程之優劣的方法。(8分)
(c) 說明Johnson's Rule的適用時機與條件。(6分)
(d) 說明看板(Kanban Card)與容器(Container)在Just-in-Time生產系統中所發揮的功能。(6分)

國立雲林技術學院
八十六學年度研究所碩士班入學考試試題

所別：工業工程與管理技術研究所
科目：微積分與線性代數

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%) 已知積分 $\int \frac{3x+11}{(x+2)(x+3)}dx$ = A + B + 常數，A=?, B=?

2.(10%) 求圓柱 $z=4/(y^2+1)$ 及平面 $y=x$, $y=3$, $z=0$ 所圍成封閉形狀之體積。

3.(10%) 求 $\lim_{x\to 0}\frac{e^x-e^{-x}-2x}{x-\sin x}$ 之值。

4.(10%) 求橢圓 $4x^2+9y^2=40$ 在點 $(1,2)$ 之切線方程式。

5.(10%) 求積分 $\int x^2\cos x\,dx$ = ?

6.(10%) 令 A 為一方陣square matrix

$$A=\begin{bmatrix} 0 & a & 0 & 0 \\ b & 0 & c & 0 \\ 0 & d & 0 & e \\ 0 & 0 & f & 0 \end{bmatrix}$$

證明矩陣中的 a、b、c、d、e、和 f 為任何實數值，A矩陣都是不可逆 not invertible。

7.(10%) 令 $S=\{v_1, v_2, \ldots, v_r\}$ 為 $r>0$ 個向量 vector 所成的集合。定義在集合S中這 r 個向量為線性相依 linear dependent 及線性不相依 linear independent。

8.(10%) 證明若方陣square matrix A 為可逆 invertible，則其逆矩陣 inverse matrix為唯一。

國立雲林技術學院
八十六學年度研究所碩士班入學考試試題

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9.(10%)令

$$A=\begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}$$

若$\det(A) = -7$，計算

(i) $\det((2A)^{-1})$

(ii) $\det\begin{bmatrix} a & g & d \\ b & h & e \\ c & i & f \end{bmatrix}$

10. (10%) Show the distance D between a point $P_0(x_0, y_0, z_0)$ and the plane $ax + by + cz + d = 0$ is

$$D=\frac{|ax_0+by_0+cz_0+d|}{\sqrt{a^2+b^2+c^2}}$$

國立雲林技術學院　　所別：工業工程與管理技術研究所
八十六學年度研究所碩士班入學考試試題　　科目：管理概論

1.Maslow的需求層次理論，認爲在工作中的人們可以用"使滿足其內在需求的慾望"來激勵之，請說明他提出的五個需求層次及其理論架構的三點假設。 30%

2.請說明管理幅度並申論組織扁平化的優缺點。 30%

3.提昇台灣的競爭力是邁向廿一世紀必須的手段，從你所身處的行業，試申論該行業競爭力在策略上、經營管理上須如何因應，並評估其預期效益。 40%

國立雲林技術學院
八十六學年度研究所碩士班入學考試試題

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科目：管理實務與案例

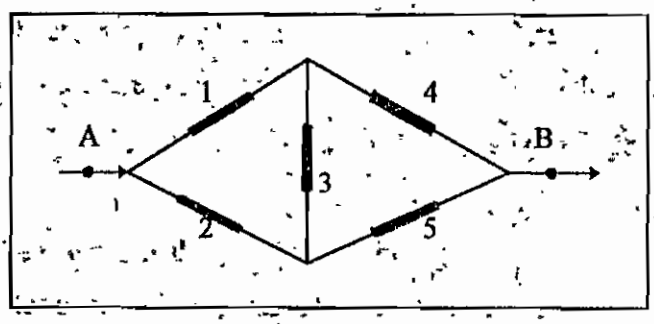
1.請列舉一個你所知道(碰到過或聽過)在管理上(沒有限制範圍，如人事、財務、生管、品管、行銷等皆可以)的問題，並說明其解決方法步驟及效益評估。 50%

2.請說明
倉儲的內容
倉儲管理的內容
倉儲管理電腦化的內容
倉儲管理自動化的內容
並試列舉一個倉儲管理上的困難，且說明此困難是否在電腦化或自動化之後可獲得什麼程度的解決。 50%

國立雲林技術學院
八十六學年度研究所碩士班入學考試試題

所別：工業工程與管理技術研究所
科目：統計學

1. (10%) Consider the following circuit system:



Let E_i be the event that component i functions well for $i = 1,2,...,5$. Let E be the event that circuit can pass through from A to B. Suppose the 5 components are mutually independent and $P(E_i) = 0.9$ for all i. Answer the following questions:

(a) Represent the event E in terms of events E_i s and set operations.

(b) Evaluate the system reliability $P(E)$.

2. (10%) Let X equal the number of alpha particles emitted by barium-133 per second and counted by a Geiger counter. Assume that X has a Poisson distribution with $\lambda = 49$. Approximate $P(45 < X < 60)$.

3. (10%) Let X_1, X_2 denote a random sample from a distribution $\chi^2(2)$.

(a) Find the joint p.d.f. of $Y_1 = X_1$ and $Y_2 = X_1 + X_2$ where $0 < Y_1 < Y_2 < \infty$. [4%]

(b) Find the marginal p.d.f. of Y_1 and Y_2. [3%]

(c) Are Y_1 and Y_2 independent? [3%]

國立雲林技術學院
八十六學年度研究所碩士班入學考試試題

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4. (15%) The defect proportion of a *large quantity* of microchips is p. A quality engineer wants to estimate p by randomly investigating 100 chips. Let X_i be 1 if the i-th investigated chip is defect and 0 if the i-th investigated chip is good, $i = 1,2,...,100$.

(a) Determine the maximum likelihood estimator of p.

(b) Is the estimator in problem (a) biased? What does it mean?

(c) What is the *maximum possible* standard error of the estimator in problem (a)?

(d) Construct a 90% *one-sided* upper confidence interval [0, upper limit] for p. How should the engineer interpret (解釋,說明) this interval to his boss?

(e) Suppose customers require that p be smaller than some constant p^*. How should the engineer judge whether the chips are acceptable based on the interval of (d)?

5. (15%) A certain size bag is designed to hold 25 pounds of potatoes. A farmer fills such bags in the field. Assume that the weight X of potatoes in a bag is $N(\mu, 9)$. We shall test the null hypothesis $H_0: \mu = 25$ against the alternative hypothesis $H_1: \mu < 25$. Let x_1, x_2, x_3, x_4 be a random sample of size 4 from this distribution, and let the critical region be defined by $C \equiv \{\bar{X} : \bar{X} \leq 22.5\}$.

(a) What is the power function $K(\mu)$ of this test ? In particular, what is the significance level α ?

(b) If the sample values $(x_1, x_2, x_3, x_4) = (21.24, 24.81, 23.62, 26.82)$, would you accept or reject H_0 ?

(c) What is the p-value associated with $\bar{X}$ in part (b) ?

國立雲林技術學院　所別：工業工程與管理技術研究所
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6. (15%) A gasoline company develops a new formula gas and expects that it will get higher mileage. The company randomly selects 20 cars of the same model; 10 of them are filled with the new formula gas, and the rest 10 are filled with conventional gas. The following are the mileage of the 20 cars:

new formula gas: 5.2, 6.1, 4.9, 7.4, 6.0, 5.7, 4.5, 6.7, 7.0, 6.6

conventional gas: 4.1, 4.9, 6.2, 6.9, 6.8, 4.4, 5.7, 5.8, 6.9, 4.7

(a) Test whether the *variances* of mileage of the two formulas gas is the same at 0.1 significance level. [4%]

(b) Set up the hypotheses from customers' viewpoint to test whether the average mileage of the new gas is better than that of conventional gas. [4%]

(c) Conduct an appropriate test for the hypotheses of problem (b). What is the p-value of the test? What is your conclusion if the significance level is 0.05? [4%]

(d) How could you improve the comparison experiment and why? [3%]

7. (15%) The salary (Y) and work experience (X) of ten employees are as follow: Σx_i=12.8, Σy_i=593.5, Σx_i^2=21.64, $\Sigma x y_i$=974.33, Σy_i^2=44578.4

(a) What is the linear regression equation of Y vs. X?

(b) Use ANOVA to perform the test of significance of regression with α =0.05.

(c) What are the basic assumptions of simple linear regression model ?

8. (10%) A survey was conducted in two cities to determine voters' support for three parties in an upcoming election. 500 qualified voters were randomly selected from each city and the following data were recorded:

國立雲林技術學院
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科目：統計學

voter support	City I	City II
Party A	204	225
Party B	211	198
Party C	85	77

(a) Set up the hypotheses to test whether the 3 parties get the same support between the two cities.

(b) Conduct an appropriate test at 0.1 significance level. What is your conclusion?

國立雲林技術學院
八十六學年度研究所碩士班入學考試試題

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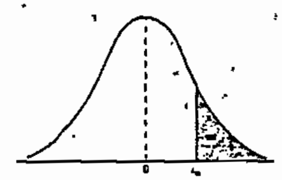
科目：統計學

(*continued*) Areas Under the Normal Curve

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
0.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
0.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
0.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9278	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990
3.1	.9990	.9991	.9991	.9991	.9992	.9992	.9992	.9992	.9993	.9993
3.2	.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996	.9996	.9996	.9996	.9996	.9997
3.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9998



Critical Values of the t-Distribution

	α						
ν	0.40	0.30	0.20	0.15	0.10	0.05	0.025
1	0.325	0.727	1.376	1.963	3.078	6.314	12.706
2	0.289	0.617	1.061	1.386	1.886	2.920	4.303
3	0.277	0.584	0.978	1.250	1.638	2.353	3.182
4	0.271	0.569	0.941	1.190	1.533	2.132	2.776
5	0.267	0.559	0.920	1.156	1.476	2.015	2.571
6	0.265	0.553	0.906	1.134	1.440	1.943	2.447
7	0.263	0.549	0.896	1.119	1.415	1.895	2.365
8	0.262	0.546	0.889	1.108	1.397	1.860	2.306
9	0.261	0.543	0.883	1.100	1.383	1.833	2.262
10	0.260	0.542	0.879	1.093	1.372	1.812	2.228
11	0.260	0.540	0.876	1.088	1.363	1.796	2.201
12	0.259	0.539	0.873	1.083	1.356	1.782	2.179
13	0.259	0.537	0.870	1.079	1.350	1.771	2.160
14	0.258	0.537	0.868	1.076	1.345	1.761	2.145
15	0.258	0.536	0.866	1.074	1.341	1.753	2.131
16	0.258	0.535	0.865	1.071	1.337	1.746	2.120
17	0.257	0.534	0.863	1.069	1.333	1.740	2.110
18	0.257	0.534	0.862	1.067	1.330	1.734	2.101
19	0.257	0.533	0.861	1.066	1.328	1.729	2.093
20	0.257	0.533	0.860	1.064	1.325	1.725	2.086
21	0.257	0.532	0.859	1.063	1.323	1.721	2.080
22	0.256	0.532	0.858	1.061	1.321	1.717	2.074
23	0.256	0.532	0.858	1.060	1.319	1.714	2.069
24	0.256	0.531	0.857	1.059	1.318	1.711	2.064
25	0.256	0.531	0.856	1.058	1.316	1.708	2.060
26	0.256	0.531	0.856	1.058	1.315	1.706	2.056
27	0.256	0.531	0.855	1.057	1.314	1.703	2.052
28	0.256	0.530	0.855	1.056	1.313	1.701	2.048
29	0.256	0.530	0.854	1.055	1.311	1.699	2.045
30	0.256	0.530	0.854	1.055	1.310	1.697	2.042
40	0.255	0.529	0.851	1.050	1.303	1.684	2.021
60	0.254	0.527	0.848	1.045	1.296	1.671	2.000
120	0.254	0.526	0.845	1.041	1.289	1.658	1.980
∞	0.253	0.524	0.842	1.036	1.282	1.645	1.960

國立雲林技術學院
八十六學年度研究所碩士班入學考試試題

所別：工業工程與管理技術研究所
科目：統計學

Percentage Points of the χ^2 Distribution[a]

ν \ α	.995	.990	.975	.950	.900	.500	.100	.050	.025	.010	.005
1	.00+	.00+	.00+	.00+	.02	.45	2.71	3.84	5.02	6.63	7.88
2	.01	.02	.05	.10	.21	1.39	4.61	5.99	7.38	9.21	10.60
3	.07	.11	.22	.35	.58	2.37	6.25	7.81	9.35	11.34	12.84
4	.21	.30	.48	.71	1.06	3.36	7.78	9.49	11.14	13.28	14.86
5	.41	.55	.83	1.15	1.61	4.35	9.24	11.07	12.83	15.09	16.75
6	.68	.87	1.24	1.64	2.20	5.35	10.65	12.59	14.45	16.81	18.55
7	.99	1.24	1.69	2.17	2.83	6.35	12.02	14.07	16.01	18.48	20.28
8	1.34	1.65	2.18	2.73	3.49	7.34	13.36	15.51	17.53	20.09	21.96
9	1.73	2.09	2.70	3.33	4.17	8.34	14.68	16.92	19.02	21.67	23.59
10	2.16	2.56	3.25	3.94	4.87	9.34	15.99	18.31	20.48	23.21	25.19
11	2.60	3.05	3.82	4.57	5.58	10.34	17.28	19.68	21.92	24.72	26.76
12	3.07	3.57	4.40	5.23	6.30	11.34	18.55	21.03	23.34	26.22	28.30
13	3.57	4.11	5.01	5.89	7.04	12.34	19.81	22.36	24.74	27.69	29.82
14	4.07	4.66	5.63	6.57	7.79	13.34	21.06	23.68	26.12	29.14	31.32
15	4.60	5.23	6.27	7.26	8.55	14.34	22.31	25.00	27.49	30.58	32.80
16	5.14	5.81	6.91	7.96	9.31	15.34	23.54	26.30	28.85	32.00	34.27
17	5.70	6.41	7.56	8.67	10.09	16.34	24.77	27.59	30.19	33.41	35.72

Percentage Points of the *F* Distribution (*continued*)

$F_{.05,\nu_1,\nu_2}$

ν_2 \ Degrees of freedom for the numerator (ν_1)	1	2	3	4	5	6	7	8	9	10	12	15	20	24	30	40	60	120	∞
1	161.4	199.5	215.7	224.6	230.2	234.0	236.8	238.9	240.5	241.9	243.9	245.9	248.0	249.1	250.1	251.1	252.2	253.3	254.3
2	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38	19.40	19.41	19.43	19.45	19.45	19.46	19.47	19.48	19.49	19.50
3	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81	8.79	8.74	8.70	8.66	8.64	8.62	8.59	8.57	8.55	8.53
4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	5.96	5.91	5.86	5.80	5.77	5.75	5.72	5.69	5.66	5.63
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	4.74	4.68	4.62	4.56	4.53	4.50	4.46	4.43	4.40	4.36
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	4.06	4.00	3.94	3.87	3.84	3.81	3.77	3.74	3.70	3.67
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.64	3.57	3.51	3.44	3.41	3.38	3.34	3.30	3.27	3.23
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	3.35	3.28	3.22	3.15	3.12	3.08	3.04	3.01	2.97	2.93
9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.14	3.07	3.01	2.94	2.90	2.86	2.83	2.79	2.75	2.71
10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.98	2.91	2.85	2.77	2.74	2.70	2.68	2.62	2.58	2.54
11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90	2.85	2.79	2.72	2.65	2.61	2.57	2.53	2.49	2.45	2.40
12	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80	2.75	2.69	2.62	2.54	2.51	2.47	2.43	2.38	2.34	2.30
13	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71	2.67	2.60	2.53	2.46	2.42	2.38	2.34	2.30	2.25	2.21
14	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65	2.60	2.53	2.46	2.39	2.35	2.31	2.27	2.22	2.18	2.13
15	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59	2.54	2.48	2.40	2.33	2.29	2.25	2.20	2.16	2.11	2.07
16	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54	2.49	2.42	2.35	2.28	2.24	2.19	2.15	2.11	2.06	2.01
17	4.45	3.59	3.20	2.96	2.81	2.70	2.61	2.55	2.49	2.45	2.38	2.31	2.23	2.19	2.15	2.10	2.06	2.01	1.96
18	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46	2.41	2.34	2.27	2.19	2.15	2.11	2.06	2.02	1.97	1.92
19	4.38	3.52	3.13	2.90	2.74	2.63	2.54	2.48	2.42	2.38	2.31	2.23	2.16	2.11	2.07	2.03	1.98	1.93	1.88
20	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39	2.35	2.28	2.20	2.12	2.08	2.04	1.99	1.95	1.90	1.84
21	4.32	3.47	3.07	2.84	2.68	2.57	2.49	2.42	2.37	2.32	2.25	2.18	2.10	2.05	2.01	1.96	1.92	1.87	1.81
22	4.30	3.44	3.05	2.82	2.66	2.55	2.46	2.40	2.34	2.30	2.23	2.15	2.07	2.03	1.98	1.94	1.89	1.84	1.78
23	4.28	3.42	3.03	2.80	2.64	2.53	2.44	2.37	2.32	2.27	2.20	2.13	2.05	2.01	1.96	1.91	1.86	1.81	1.76
24	4.26	3.40	3.01	2.78	2.62	2.51	2.42	2.36	2.30	2.25	2.18	2.11	2.03	1.98	1.94	1.89	1.84	1.79	1.73
25	4.24	3.39	2.99	2.76	2.60	2.49	2.40	2.34	2.28	2.24	2.16	2.09	2.01	1.96	1.92	1.87	1.82	1.77	1.71
26	4.23	3.37	2.98	2.74	2.59	2.47	2.39	2.32	2.27	2.22	2.15	2.07	1.99	1.95	1.90	1.85	1.80	1.75	1.69
27	4.21	3.35	2.96	2.73	2.57	2.46	2.37	2.31	2.25	2.20	2.13	2.06	1.97	1.93	1.88	1.84	1.79	1.73	1.67
28	4.20	3.34	2.95	2.71	2.56	2.45	2.36	2.29	2.24	2.19	2.12	2.04	1.96	1.91	1.87	1.82	1.77	1.71	1.65
29	4.18	3.33	2.93	2.70	2.55	2.43	2.35	2.28	2.22	2.18	2.10	2.03	1.94	1.90	1.85	1.81	1.75	1.70	1.64
30	4.17	3.32	2.92	2.69	2.53	2.42	2.33	2.27	2.21	2.16	2.09	2.01	1.93	1.89	1.84	1.79	1.74	1.68	1.62
40	4.08	3.23	2.84	2.61	2.45	2.34	2.25	2.18	2.12	2.08	2.00	1.92	1.84	1.79	1.74	1.69	1.64	1.58	1.51
60	4.00	3.15	2.76	2.53	2.37	2.25	2.17	2.10	2.04	1.99	1.92	1.84	1.75	1.70	1.65	1.59	1.53	1.47	1.39
120	3.92	3.07	2.68	2.45	2.29	2.17	2.09	2.02	1.96	1.91	1.83	1.75	1.66	1.61	1.55	1.50	1.43	1.35	1.25
∞	3.84	3.00	2.60	2.37	2.21	2.10	2.01	1.94	1.88	1.83	1.75	1.67	1.57	1.52	1.46	1.39	1.32	1.22	1.00

國立雲林技術學院
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工業工程與管理技術研究所
科目：經濟學

Part I. Microeconomics: (each question 2.5 points)

Multiple Choice: Choose the best answer.

1. Assume D(P) = 70 - 4P and S(P) = 10 + 2P. A price ceiling of $15 would
   a. be ineffective.
   b. cause a shortage.
   c. cause a surplus.
   d. create equilibrium.

2. Markets do NOT require
   a. property rights.
   b. government enforcement of the laws.
   c. the absence of inflation.
   d. relative freedom of contract.

3. If A is preferred to B and B is preferred to C, then the axiom of transitivity maintains that
   a. whether A is preferred to C depends on the costs of A and C.
   b. A will always be preferred to C.
   c. C can be preferred to A in some circumstances.
   d. A and C are indifferent.

4. Indifference curves are upward-sloping
   a. between goods with negative marginal utility.
   b. between one good with positive marginal utility and another good of negative marginal utility.
   c. between goods with positive marginal utility.
   d. if less is better.

5. Which of the following statements is false?
   a. Under uncertainty, a utility function that displays diminishing marginal utility of income describes a risk-lover.
   b. A risk-averter will refuse any gamble involving $0 in expected value.
   c. A risk-lover will accept any gamble involving $0 in expected value.
   d. It is possible for the same person to be a risk-lover and a risk-averter over different ranges of income.

6. The budget line shows the various combinations of commodity bundles
   a. that yield the same utility.
   b. that have a cost equal to the consumer's income.
   c. in which the marginal rate of substitution equals the price ratio.
   d. in which the marginal rate of substitution is constant.

7. The consumer should buy more of good 2 when
   a. $MU_1/P_1 > MU_2/P_2$.
   b. $MU_1/MU_2 < P_1/P_2$.
   c. $P_2/MU_2 < P_1/MU_1$.
   d. $MU_1 > MU_2$.

8. For an inferior good, the income effect
   a. reinforces the substitution effect.
   b. exceeds the substitution effect.
   c. offsets the substitution effect.
   d. is zero.

9. The demand curve for a good is $Q = 400/P + 20$. The elasticity of demand is:
   a. elastic. b. inelastic. c. unitary. d. elastic or inelastic depending on the price.

10. Tanys buys 20 records a month. The price of records rises from $4 to $6. Then a compensating change in monthly income would be:
   a. $10. b. $20. c. $120. d. $40.

11. The law of scarcity
   a. must hold in all society.
   b. no longer holders in modern economics.
   c. implies there are no free goods.
   d. implies wants are limited compared to resources.

12. When a consumer faces satiation in both goods, his or her system of indifference curves are
   a. circular in shape.
   b. everywhere concave to the origin.
   c. upward-sloping.
   d. downward-sloping.

13. When a production function exhibits constant-returns-to-scale,
   a. there can be no law of diminishing returns.
   b. output per unit of labor would not be affected by an equi-proportionate change in both L and K.
   c. the isoquants are symmetric about a 45 degree line.
   d. output per unit of labor may be affected by an equi-proportionate change in both L and K when diminishing returns sets in.

14. If isocost line becomes steeper, then
   a. the cost of production must increase.
   b. the total cost must increase.
   c. the relative cost of the factor on the horizontal axis must be increasing.
   d. output must increase.

15. If the marginal and average products of labor are equal, it must follow that
   a. ATC is minimized. b. AVC is minimized. c. MC = ATC. d. MC = MP_L.

16. One of the following has been questioned as a legitimate barrier to entry by newer industrial organization economists:
   a. sunk costs. b. patents. c. government franchising. d. economies of scale.

17. If a monopolist can charge a fee for the right to freely buy his or her product, the monopolist would try to set the fee
   a. each customer's demand price.
   b. each customer's consumer surplus.
   c. each customer's marginal utility.
   d. the marginal cost of the product.

18. With a nominal interest rate of 5 percent, people expect an inflation rate of 2 percent. The real interest rate is approximately:
   a. 3 percent. b. 5 percent. c. 7 percent. d. 2.5 percent.

19. If the demand curve is P = 50 - 6Q, the marginal revenue curve is:
   a. MR = 50 -Q/3. b. MR = 50 - 12Q. c. MR = 25/3 - Q/3. d. MR = 25 - 6Q.

20. Suppose MC = AC = $10. Calculate the monopoly deadweight loss for the demand curve P = 50 - 5Q.
   a. $40. b. $60. c. $80. d. $100.

Part II. Macroeconomics

一. 選擇題: (單選, 每題 4 分, 共 32 分)

21. According to the quantity theory of money, what is the percentage change of income velocity, if the rate of money supply, inflation rate, and the growth rate of output rise 3%, 6%, and 2%, respectively?
(A) 4%
(B) 5%
(C) 6%
(D) 7%
(E) 8%

22. Suppose that the nominal interest rate equals 9 percent, the expected inflation rate is 5 percent, and actual inflation turns out to be 3 percent. In this case:
(A) the *ex ante* real interest rate is 4 percent.
(B) the *ex post* real interest rate is 4 percent.
(C) the *ex ante* real interest rate is 6 percent.
(D) the *ex post* real interest rate is 2 percent.
(E) none of all.

23. According to the new Keynessian economics, sticky wages and prices in the short run are the result of :
(A) rational expectation.
(B) menu costs and staggered wage and price settings.
(C) changes in the money supply by the Fed.
(D) perfect competition.
(E) none of all.

24. According to real business cycle theory, an increase in the money supply will
(A) decrease the real interest rate.
(B) increase the real interest rate.
(C) have no effect on the real interest rate.
(D) either decrease or have no effect on the real interest rate.
(E) either increase or have no effect on the real interest rate.

25. In a small open economy with a floating exchange rate, monetary expansion does all of the following EXCEPT:
(A) lower the interest rate.
(B) increase the equilibrium income level.
(C) decrease the exchange rate.
(D) cause net exports to rise.
(E) none of all.

26. Suppose that a consumption function concludes not only disposable income but also wealth. Which of the following statements is likely to happen?
(A) The increase in money supply will lead to a rise in consumption.
(B) The increase in inflation rate will lead to a decrease in consumption.
(C) The classical dichotomy will not hold.
(D) The consumption function supports the main features of the permanent income hypothesis.
(E) all of the above.

27. Suppose that two LM curves are specified as

$$LM_1: \ M/P = 0.8Y - 0.2r, \text{ and}$$

$$LM_2: \ M/P = 0.6Y - 0.3r.$$

The two curves can imply:
(A) LM_1 has a larger income elasticity of money demand than LM_2.
(B) LM_1 has a smaller income elasticity of money demand than LM_2.
(C) LM_1 has a larger interest rate elasticity of money demand than LM_2.
(D) LM_1 has a smaller interest rate elasticity of money demand than LM_2.
(E) none of all.

28. Suppose that an economy has the following macroeconomic model:

$$Y = C + I + G,$$
$$C = 50 + 0.75(Y-T),$$
$$T = 20 + 0.2Y,$$
$$I = 25,$$
$$G = 10,$$

where Y = income, C = consumption expenditure, T = tax, I = investment expenditure, and G = government expenditure.
Which of the following statements is true?

(A) The equilibrium income is 280.
(B) If both G and T increase by 20, then equilibrium income rises by 20.
(C) If investment increases from 25 to 45, then equilibrium income rises by 60.
(D) If T is changed to T = 20 rather than T = 20 + 0.2Y, then the slope of IS curve will become more flatter.
(E) none of all.

二 計算與問答題:

29. (a)試說明長期(long run)總供給曲線與短期(short run)總供給曲線斜率不同之原因.
(b)如果政府減少貨幣供給(money supply), 則所得, 利率水準及一般物價水準其長期與短期會有何變化? (10分)

30. 假設一個經濟社會的菲力浦曲線(Phillips curve)爲:

$$\pi_t = \pi_{t-1} - 0.5(\mu_t - \mu_t^n),$$
$$\mu_t^n = 0.5(\mu_{t-1} + \mu_{t-2})$$

其中, π_t = 在 t 期的通貨膨脹率,
μ_t = 在 t 期的真實失業率,
μ_t^n = 在 t 期的自然失業率,

試問:
(a) 如果這個經濟社會的通貨膨脹率增加 1%, 則其失業率將變動多少%?
(b) 這個經濟社會的長期(long run)菲力浦曲線會是垂直的曲線嗎? 爲什麼? (8 分)

國立雲林技術學院
八十六學年度研究所碩士班入學考試試題

所別：資訊管理技術研究所、工業工程與管理技術研究所
科目：計算機概論

本份試題共有 10 題，每題 10 分。

1. 以圖解分別畫出 cpu, system bus, interrupt controller, peripheral device, 及相關控制線以說明 interrupt I/O 之動作原理。

2. 解釋 IEEE 802.3 (CSMA/CD), IEEE 802.5 (Token-Ring), IEEE 802.6 (DQDB) 協定，並點出其在低載及高載時之主要效能特點。

3. Groupware 產品如 Notes 或 Exchanger 越來越受企業界之重視，你認為它們能幫企業做些甚麼？

4. 盡你所能解釋任何一種系統分析方法(如 Yourdon 之 SA) 之實施步驟及各步驟之產出文件。

5. 舉實例說明視覺程式環境（如 Delphi, Visual-Basic, Borland C++）之程式設計步驟。

6. 假設日期資料以月/日/年方式表示 (例如：民國 86 年 5 月 10 日以 5/10/97 表示之)
   a) 若以聚集資料型式(Packed Data Format)表示上述日期資料，則至少需多少位元(bit)，才能完全表示所有可能的日期？
   b) 請以聚集資料型式表示 5/10/97 ，並轉換為 Hexadecimal 值。
   c) 如何使用 shift 和 logical 運算萃取 (extract) (b)答案中的「日」的資料。
   d) 聚集資料型式有何優缺點？

7. 時間性位置參考 (Temporal Locality of Reference) 和空間性位置參考 (Spatial Locality of Reference) 是大部份的程式在執行時可能會產生的兩種現象，快取記憶體 (cache) 的使用是解決此現象的方法之一，請解釋此兩種現象？又 cache 如何解決？

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8. 在理想的情況下管線 (pipeline) 似乎可以在一個時鐘循環(clock cycle)執行一個機器指令 (machine instruction)，請舉例說明管線如何做到？並解釋其可能產生的問題及解決方法？

9. 假設給定一組正的數字(positive integer, $S=\{a_1, a_2, a_3, \ldots, a_n\}$，且後一個數字均大於前面所有數字的和，例如:S={1, 4, 11, 17, 38, 73})，另給定一個目標 (Target, T, 例如:T=53)，請設計一個通用的演算方法 (general algorithm)，找出一向量 (Vector, $V=[v_1, v_2, v_3, \ldots, v_n]$, v_i 的值為 0 或 1, 例如: V=[0, 1, 1, 0, 1, 0]) 使 $\sum_{i=1}^{n} a_i \times v_i = T$，請用流程圖(flow chart)或虛擬碼(pseudo code)方式表示，並使用題目上的例子說明你的演算法可行。

10. 解釋何謂多元程式作業(multiprogramming)？一個支援多元程式作業的作業系統 (operating system)，必須確保一些共享系統資源，能正確且安全的使用，請以記憶體為例，說明三種可行的保護方法？