1. 東元電機和聲寶電子的合併案，你認為在策略上的涵義為何，請詳細說明你的觀點(15%)？又此合併案成功之可能關鍵成功因素為何(10%)？

2. 何謂「產業空洞化」？(10%)，請分別就企業和政府的角度分析此一現象之長短期效果(15%)。

3. 「施振榮」先生之於宏碁、「張忠謀」先生之於台積電、「證嚴法師」之於慈濟，上述三種情形說明了什麼共同之處(5%)？你認為上述共同之處對於組織的發展是利是弊(10%)？有何解決之道(10%)？

4. 請閱讀以下短文，回答問題。

International businesses frequently face **sourcing decisions**, decisions about whether they should make or buy the component parts that go into their final products. Should the firm vertically integrate to manufacture its own component parts or should it outsource them, or buy them from independent suppliers? In the automobile industry, for example, the typical car contains more than 10,000 components, so automobile firms constantly face the make-or-buy decisions.

(1) Under what conditions, international businesses will tend to choose the "make" decision? (9%)
(2) Under what conditions, international businesses will tend to choose the "buy" decision? (8%)
(3) Can you provide some possible ways that may prevent the disadvantage from using the "make" or "buy" decision? (8%)

一、解釋名詞 (25%)

1. Control chart
2. Pooled sample variance
3. Sign rank test
4. Skewness
5. Power

二、某牌汽車的顏色有下列五種顏色：綠、黃、紅、藍及白色。營業部想要瞭解各顏色受歡迎程度，由最近的訂購單隨機抽取 300 張得到如下數據：

顏色	綠	黃	紅	藍	白	合計
數量	40	65	52	55	88	300

試以 $\alpha = 0.05$ 及 $\alpha = 0.01$ 檢定各種顏色均同樣受歡迎的假設。 (20%)

$\chi^2(0.95,4)=9.487$ $\chi^2(0.99,4)=13.276$

三、某公司生產電冰箱其烤漆平均有 3 個缺點且適合 Poisson distribution，試問顧客買到冰箱其烤漆缺點最多有一個的機率是多少？(15%)

四、試問下列四家廠商輪胎平均壽命是否有顯著差異。（20%）

四種廠牌輪胎平均壽命

廠商	壽命									
Y_1	85	83	75	92	83	82	80	78	84	84
Y_2	76	88	74	79	86	89	95	88	84	90
Y_3	85	82	77	84	66	81	79	76	78	83
Y_4	83	91	92	88	85	84	75	89	93	87

$F(3,36,0.05)=2.87$

五、從下列統計程式報表，說明迴歸式及觀察值之分析結果。(20%)

(1) ANOVA 表

Analysis of Variance

Source	DF	Sum of squares	Mean	F value	Prob>F
Model	3	950.16621	316.72207	19.112	0.0018
Error	6	99.43379	16.57230		
C Total	9	1049.60000			

Root MSE	4.07091	R-square	0.9053
Dep mean	45.20000	Adj R-sq	0.8579
C.V.	9.00644		

(2) 參數估計表

Variable	df	Parameter estimate	Standard error	T for Ho: Parameter=0	Prob
Intercept	1	17.144250	7.10953488	2.411	0.0525
X1	1	0.129250	0.05846640	2.211	0.0691
X2	1	4.672470	1.81558182	2.576	0.0420
X3	1	-0.325541	0.48814219	-0.667	0.5296

(3) 擬合值與殘差值

序號 OBS	殘差值 e	殘差平方 e^2
1	0.22808	0.05202
2	1.97922	3.917312
3	7.61009	57.91347
4	-0.24287	0.058986
5	-0.10197	0.010398
6	-3.35207	11.23637
7	1.64165	2.695015
8	-3.79905	14.43278
9	-1.18641	1.407569
10	2.77667	7.709896
合計	0	99.4338

1 (20%) Find the values of x for the following two series converges.

(a) $\sum_{n=0}^{\infty} \frac{(-1)^n x^n}{n!}$ (b) $1+\sum_{n=1}^{\infty} \frac{m(m-1)\cdots(m-n+1)}{n!}x^n$

2 (20%) Find the first derivatives of the following functions.

(a) $f(x)=\left|\frac{x^2\sqrt[3]{3x+2}}{(2x-3)^3}\right|, x\neq\frac{3}{2},0,-\frac{2}{3}$ (b) $f(x)=\ln\left|\sec x+\tan x\right|$

3 (10%) By using methods of differentiation and integration, evaluate the value of $f(a)$ where a is a constant.

$$f(a)=a^2+2a^3+3a^4+\ldots.+na^{n+1}+\ldots.$$

4 (10%) Given the function $f(x,y,z)=xe^{yz}+ye^{xz}+ze^{xy}$, find the directional derivative at $P(1,0,2)$ in the direction going from P to $P'(5,3,3)$.

5 (10%) Evaluate $\int_0^2\int_0^{\frac{x^2}{2}} \frac{x}{\sqrt{1+x^2+y^2}}dydx$.

6 (10%) Find the minimum of the function $f(x,y)=x^2+2y^2+2xy+2x+3y$, subject to the condition that x and y satisfy the equation $x^2-y=1$.

7 (10%) A region S is bounded by the surfaces $x^2+y^2-2x=0$, $4z=x^2+y^2$, $z^2=x^2+y^2$. Use cylindrical coordinates to find the volume $V(S)$.

8 (10%) Suppose that f is continuous on an interval $[a, b]$ and c is come number in this interval. Define the function F by $F(x)=\int_c^x f(t)dt$ for each x in the interval (a, b). Please show that $\frac{dF}{dx}=f(x)$.

1. A firm producing motherboard has a production function given by $Q=\sqrt{KL}$. In this production function, Q, K and L stand output, capital stock and labor, respectively. In the short run, the firm's amount of capital equipment is fixed at K = 400. The rental rate for K is r = 1, and the wage rate for L is w = 4.
   a. Express the firm's short-run total cost and short-run average cost in terms of Q. (5%)
   b. At what level of the output, the short-run average cost equals the short-run marginal cost? (5%)
   c. Assume that capital stock is fixed at $\overline{K}$ (not necessarily be 200). Express the firm's long-run total costs as a function of Q, w, r and $\overline{K}$. (5%)
   d. Calculate the function of the capital stock that minimizes the firm's total cost in the long run. (5%)
   e. What is the total cost of motherboard production in the long run? (5%)

2. A typical consumer's utility from consuming goods, X and Y, is given by the following utility function: $U=X^{0.4}Y^{0.6}$.
   a. Calculate the uncompensated demand functions for X and Y. (5%)
   b. Derive the indirect utility function. (5%)
   c. What is the expenditure function for X and Y? (5%)
   d. Derive the compensated demand function for X. (5%)
   e. Show that Slutsky equation holds in this case. (5%)

3. A representative firm seeks to maximize its profit, which is given by (Y – wL), where w is the wage rate and L is the labor input. Y is the firm's output and is given by the production function Y = F(eL), where e denotes workers' effort and F(eL) is well behaved. The effort is specified by

$$e=\begin{cases}\left(\dfrac{w-x}{x}\right)^{\beta} & \text{if } w>x\\ 0 & \text{otherwise,}\end{cases}$$

$x = (1\text{-}bu)\, w_a$

where $0 < \beta < 0$ and $b > 0$. Furthermore, w_a is the wage paid by other firms and u is the unemployment rate. x is a measure of labor market conditions. If b equals 1, x is the wage paid at other firms multiplied by the fraction of workers who are employed. If b is less than 1, workers put less weight on unemployment. If b is greater than 1, workers put more weight on unemployment.
   a. What is the unemployment rate of this economy? (5%)
   b. What is the equilibrium effort of workers? (5%)

4. Consider an economy described by an aggregate production function as: Y = AF(K,L), where Y, K and L stand aggregate output, capital stock and labor, respectively. Furthermore, A represents an index of current technology used in producing final goods.
   a. Derive the growth accounting equation. (5%)
   b. Explain how to measure the growth rate of technology based on the availability of empirical data. (5%)

Suppose now that one may specify the aggregate production function as a constant return to scale function in K and L, i.e. the aggregate production function could be rewritten as $Y = AK^{0.5}L^{0.5}$. Moreover, the environments of this economy are numerically shown as that the population growth rate is 5%, the depreciation rate is 15% and the saving rate is 20%. Furthermore, technology level is indexed to 8.

c. Show the production function in per worker form. (5%)
d. What are the values of the capital-labor ratio, output per worker and consumption per worker in the steady state? (5%)
e. What are the income shares of labor, capital-owners and technology-owners? (5%)
f. Based on the answer to part e, explain why this neoclassical production function is not enough to explore the origins of technology progress. (5%)
g. Calculate the golden rule capital stock per worker, and the corresponding output per worker and consumption per worker. (5%)
h. Is this economy in the situation of dynamic inefficiency? Why or why not? (5%)