國立雲林科技大學
98學年度碩士班入學招生考試試題

系所：財金系、工管所、運籌所
科目：經濟學

本試題共有五大計算題，每題的配分如各題的開頭所顯示。

1. *(20 points)* Eric receives utility from days spent traveling on vacation domestically (D) and days spent traveling in a foreign country (F) as given by the utility U(D, F) = DF. The price of a day spent traveling domestically is $160 and in a foreign country $200. Eric's annual budget for traveling is $8,000.
   (a) (*5 points*) Find Eric's utility maximizing choice of days traveling domestically and in a foreign country. Find also his utility level from consuming that bundle.
   (b) (*5 points*) Suppose that the price of domestic traveling increases to $250 per day. Calling his budget for traveling x, (suppose by now that it is unknown) find the demand for D and F under the new prices as a function of x.
   (c) (*4 points*) Find the income necessary to make Eric reach the same utility level as before the price change.
   (d) (*6 points*) Compute the quantities demanded with the new prices and the income you found in section c. Compute also the quantities demanded with the new prices and the original income. Using your answers tell us what is the total change in quantity of D due to the price increase in P_D that the consumer experiences and what part of that change is due to income or substitution effects.

2. (*15 points)* Molly's company produces knee warmers according to the following production function: $q = (K-8)^{1/4} L^{1/4}$
   (a) (*5 points*) Assuming that the unit cost of capital (r) and the unit wage (w) are both equal to 1, derive Molly's demand for inputs—capital and labor, respectively—as a function of her choice of output (q).
   (b) (*2 points*) Show that Molly's long run total cost function is given by

   $$C(q) = 8 + 2q^2.$$

   The demand for knee warmers is given by $P = 40 - Q^4$. There are no costs of entry or exit for a firm on the market for knee warmers. Any firm in this market will have access to the same technology as Molly.
   (c) (*5 points*) What will the price be in the long run in this market? How much will each firm produce in this market in the long run.
   (d) (*3 points*) How many firms will there be in this market in the long run?

3. *(15 points)* Suppose that Intel has a monopoly in the market for computer chips. In order to produce X computer chips, it costs Intel $C(X) = 2X^2$.

(a) (*2 points*) Find the marginal cost of producing a computer chip for Intel.

(b) (*5 points*) The demand for computer chips is $X_D = 12 - 0.25P$ (*i.e.* $P = 48 - 4X$). Find the level of output that maximizes Intel's profits. What price is Intel charging?

(c) (*3 points*) What level of output would maximize total surplus in the computer chip market?

(d) (*5 points*) If the government subsidized Intel s for every unit of computer chips produced, what quantity would Intel choose as a function of s? Find the choice of subsidy that maximizes total surplus, i.e., induces Intel to produce the efficient quantity from part (c).

（第4題緊接在下一頁）

4. *(18 points)* In a far away country, the total population is 1000 people (all of them are non institutional civilian people), 564 are working and 36 are looking for a job.

Assume that firms produce goods using labor as the only factor of production. The production function is written as follows:

$$Y = 2 * N$$

where Y is output, and N is employment.

The wage setting process is described by

$$W = P^e * (Z - 200 * u)$$

where W is the nominal wage, P^e is expected price level, Z is the unemployment insurance provided by the government , and u is the unemployment rate.

Firms set their price according to

$$P = (1 + \mu) * \frac{W}{2},$$

where P is the price level, and μ is the markup of the price over the cost. In this economy, the markup level is assumed to be 1 (i.e. $\mu = 1$).

(a) *(9 points)* For $P^e = P$, what is the natural unemployment rate and the natural level of output, if Z=10?

(b) *(9 points)* The government is running a fiscal surplus and they are debating whether to increase the unemployment benefits. If the government increases the unemployment benefit such that Z is increased from 10 to 13, what will be the new natural unemployment rate and the new natural level of output?

國立雲林科技大學
98學年度碩士班入學招生考試試題

系所：財金系、工管所、運籌所
科目：經濟學

5. *(32 points)* Consider two open economies, Bedostan and the Republic of Deballeria. Assume that these countries only trade with each other. Variables with subscript B and variables with subscript D correspond to Bedostan and the Republic of Deballeria, respectively. The two economies are characterized by the following set of equations:

$$C_i = c_{0i} + c_{1i} * (Y_i - T_i)$$

$$I_i = \bar{I}$$

$$G_i = \bar{G}_i$$

$$T_i = t_i * Y_i$$

$$IM_i = im_{0i} + im_{1i} * Y_i$$

$$\varepsilon = 1$$

where C is consumption; Y is income; T represents taxes; I is investment; G is government spending; IM is imports; and ε is real exchange rate, the price of Deballeria goods in terms of Bedostan goods;

i =B or D (B for Bedostan and D for Deballeria); and c_{0i}, c_{1i}, $\bar{I}$, $\bar{G}_i$, t_i, im_{0i}, im_{1i} are constant.

Let: $c_{0B} = c_{0D} = 200$, $c_{1B} = c_{1D} = 0.5$, $\bar{I} = 250$, $G_B = 114$, $G_D = 120$,

$t_B = t_D = 0.4$, $im_{0B} = im_{0D} = 40$, $im_{1B} = 0.05$, $im_{1D} = 0.3$, $\varepsilon = 1$

(a) *(8 points)* Calculate the equilibrium levels of output in the two countries.

(b) *(8 points)* Calculate the trade balance for each country.

(c) *(8 points)* Suppose the government of Bedostan wants to increase government spending by 147. What will be the new equilibrium output levels in the two economies?

(d) *(4 points)* Assume that exports are exogenously given. What is the open economy multiplier in Bedostan?

(e) *(4 points)* Suppose the two economies decide to close (ie. no trade with each other). What is the multiplier in Bedostan now, assuming all the other figures remained the same?

國立雲林科技大學
98學年度碩士班入學招生考試試題

系所：工管所、資管系
科目：統計學

(一) 選擇題：單選題，每題5分。

1. A discrete random variable X has the probability function

$$p(x)=k(1/2)^x \qquad x=1,2,3$$

What is the value of k?

(A) $\frac{1}{2}$ (B) $\frac{1}{4}$ (C) $\frac{8}{7}$ (D) $\frac{4}{3}$ (E) $\frac{7}{8}$

2. A joint probability density function of Y_1 and Y_2 is

$$f(y_1,y_2)=\begin{cases}6(1-y_2), & 0\le y_1\le y_2\le 1\\ 0, & \text{elsewhere}\end{cases}$$

Find $\mathrm{Cov}(Y_1,Y_2)$.

(A) 0.25 (B) 0.50 (C) 0.15 (D) 0.125 (E) 0.025

3. The lifetime (in hours) Y of an electronic component is a random variable with density function given by

$$f(y)=\begin{cases}\frac{1}{100}e^{-y/100}, & y>0\\ 0, \text{elsewhere}\end{cases}$$

Three of these components operate independently in a piece of equipment. The equipment fails if at least two of the components fail. What is the probability that the equipment will operate?

(A) 0.050 (B) 0.135 (C) 0.250 (D) 0.571 (E) 0.905

4. One out of three mini-vans sold by a nationwide auto dealer has a hidden defect in its transmission. What is the probability that a randomly selected purchaser of two mini-vans will wind up with at least one mini-van with a defective transmission?

(A) 0.333 (B) 0.5 (C) 0.667 (D) 0.250 (E) 0.556

5. An experienced person has an 80% probability of getting a particular job. An inexperienced person has a 50% chance of getting the same job. 60% of the applicants are inexperienced. If the job is offered to a person, what is the probability that the person was inexperienced?

(A) 0.4 (B) 0.6 (C) 0.3 (D) 0.4839 (E) 0.6667

6. The owner of a 100-room hotel has discovered that his reservations team has booked 110 reservations for an upcoming weekend. Experience has shown that 10% of reservations are "no shows." How likely is this hotel to be overbooked (i.e., have more guests arrive than there are rooms available) for this particular weekend?

(A) 0.1 (B) 0.3156 (C) 0.3 (D) 0.4839 (E) 0.9

7. There are two stocks: **A** and **B**. The price of each stock is normally distributed. Stock **A** has a mean of $20 and a standard deviation of $4. Stock **B** has a mean of $25, and the standard deviation is $8. What is the probability that the total price for buying two stocks will exceed $60?
(A) 0.4535 (B) 0.4332 (C) 0.4247 (D) 0.0753 (E) 0.0465

8. A particular product is shipped in lots of 20. At the receiving department, an inspector samples 5 items from each lot and rejects the lot if more than 1 defective is observed. If a lot contains 4 defectives, what is the probability that it will be rejected?
(A) 0.2817 (B) 0.2487 (C) 0.4696 (D) 0.632 (E) 0.8030

9. The number of industrial accidents at a particular manufacturing plant is found to average three per month. What is the probability that six accidents occurred?
(A) 0.0504 (B) 0.0899 (C) 0.1033 (D) 0.3192 (E) 0.8667

10. In a gambling game a man is paid $5 if he gets all heads or all tails when three fair coins are tossed and he pays out $3 if either one or two heads show. What is his expected gain?
(A) -2 (B) -1 (C) 0 (D) 1 (E) 2

(二) 計算題：

1. 若公司允許的型一誤差爲 5%，檢驗人員檢驗兩箱產品，在甲箱 50 個產品中有 7 個不良品，乙箱 45 個產品中也有 7 個不良品。
(a) 請問甲、乙箱產品的品質是否相同? (5%)
(b) 若此兩箱產品是分別由甲、乙台機器抽驗所得，請問甲、乙兩台機器生產的產品品質是否相同? (10%)
(c) 請求出此兩台機器產品品質差異的 98%信賴區間。(5%)

2. 某公司收集 10 位生產線上工人每小時完成工作件數 y 與其技能測驗成績 x 之資料如下：

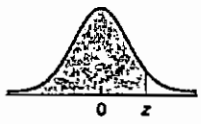
成績x	85	97	94	92	91	81	77	76	75	71
件數y	25	49	32	26	27	22	23	19	17	15

(a) 若工作件數 y 與技能測驗成績 x 爲簡單線性迴歸模型：$y_i = \beta_0 + \beta_1 x_i + \varepsilon_i$，請以最小平方法估計$\beta_0$，$\beta_1$之值。(10%)
(b) 試求 x，y 的相關係數。(10%)
(c) 列出迴歸變異數分析表，試檢定此迴歸模式是否合適($\alpha = 5\%$)？(10%)

國立雲林科技大學
98學年度碩士班入學招生考試試題

系所：工管所、資管系
科目：統計學

TABLE II (cont.)
Areas under the standard normal curve



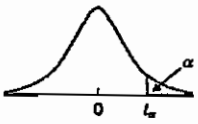
	Second decimal place in z									
z	*0.00*	*0.01*	*0.02*	*0.03*	*0.04*	*0.05*	*0.06*	*0.07*	*0.08*	*0.09*
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
3.1	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3	0.9995	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
3.4	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998
3.5	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998
3.6	0.9998	0.9998	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
3.7	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
3.8	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
3.9	1.0000†									

† For $z \geq 3.90$, the areas are 1.0000 to four decimal places.

國立雲林科技大學
98學年度碩士班入學招生考試試題

系所：工管所、資管系
科目：統計學

TABLE IV
Values of t_α



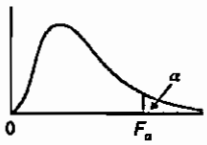
df	$t_{0.10}$	$t_{0.05}$	$t_{0.025}$	$t_{0.01}$	$t_{0.005}$	df
1	3.078	6.314	12.706	31.821	63.657	1
2	1.886	2.920	4.303	6.965	9.925	2
3	1.638	2.353	3.182	4.541	5.841	3
4	1.533	2.132	2.776	3.747	4.604	4
5	1.476	2.015	2.571	3.365	4.032	5
6	1.440	1.943	2.447	3.143	3.707	6
7	1.415	1.895	2.365	2.998	3.499	7
8	1.397	1.860	2.306	2.896	3.355	8
9	1.383	1.833	2.262	2.821	3.250	9
10	1.372	1.812	2.228	2.764	3.169	10
11	1.363	1.796	2.201	2.718	3.106	11
12	1.356	1.782	2.179	2.681	3.055	12
13	1.350	1.771	2.160	2.650	3.012	13
14	1.345	1.761	2.145	2.624	2.977	14
15	1.341	1.753	2.131	2.602	2.947	15
16	1.337	1.746	2.120	2.583	2.921	16
17	1.333	1.740	2.110	2.567	2.898	17
18	1.330	1.734	2.101	2.552	2.878	18
19	1.328	1.729	2.093	2.539	2.861	19
20	1.325	1.725	2.086	2.528	2.845	20
21	1.323	1.721	2.080	2.518	2.831	21
22	1.321	1.717	2.074	2.508	2.819	22
23	1.319	1.714	2.069	2.500	2.807	23
24	1.318	1.711	2.064	2.492	2.797	24
25	1.316	1.708	2.060	2.485	2.787	25
26	1.315	1.706	2.056	2.479	2.779	26
27	1.314	1.703	2.052	2.473	2.771	27
28	1.313	1.701	2.048	2.467	2.763	28
29	1.311	1.699	2.045	2.462	2.756	29
30	1.310	1.697	2.042	2.457	2.750	30
31	1.309	1.696	2.040	2.453	2.744	31
32	1.309	1.694	2.037	2.449	2.738	32
33	1.308	1.692	2.035	2.445	2.733	33
34	1.307	1.691	2.032	2.441	2.728	34
35	1.306	1.690	2.030	2.438	2.724	35
36	1.306	1.688	2.028	2.434	2.719	36
37	1.305	1.687	2.026	2.431	2.715	37
38	1.304	1.686	2.024	2.429	2.712	38
39	1.304	1.685	2.023	2.426	2.708	39
40	1.303	1.684	2.021	2.423	2.704	40
41	1.303	1.683	2.020	2.421	2.701	41
42	1.302	1.682	2.018	2.418	2.698	42
43	1.302	1.681	2.017	2.416	2.695	43
44	1.301	1.680	2.015	2.414	2.692	44
45	1.301	1.679	2.014	2.412	2.690	45
46	1.300	1.679	2.013	2.410	2.687	46
47	1.300	1.678	2.012	2.408	2.685	47
48	1.299	1.677	2.011	2.407	2.682	48
49	1.299	1.677	2.010	2.405	2.680	49

國立雲林科技大學
98學年度碩士班入學招生考試試題

系所：工管所、資管系

科目：統計學

TABLE VIII
Values of F_α



dfd	α	dfn 1	2	3	4	5	6	7	8	9
	0.10	39.86	49.50	53.59	55.83	57.24	58.20	58.91	59.44	59.86
	0.05	161.45	199.50	215.71	224.58	230.16	233.99	236.77	238.88	240.54
1	0.025	647.79	799.50	864.16	899.58	921.85	937.11	948.22	956.66	963.28
	0.01	4052.2	4999.5	5403.4	5624.6	5763.6	5859.0	5928.4	5981.1	6022.5
	0.005	16211	20000	21615	22500	23056	23437	23715	23925	24091
	0.10	8.53	9.00	9.16	9.24	9.29	9.33	9.35	9.37	9.38
	0.05	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38
2	0.025	38.51	39.00	39.17	39.25	39.30	39.33	39.36	39.37	39.39
	0.01	98.50	99.00	99.17	99.25	99.30	99.33	99.36	99.37	99.39
	0.005	198.50	199.00	199.17	199.25	199.30	199.33	199.36	199.37	199.39
	0.10	5.54	5.46	5.39	5.34	5.31	5.28	5.27	5.25	5.24
	0.05	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81
3	0.025	17.44	16.04	15.44	15.10	14.88	14.73	14.62	14.54	14.47
	0.01	34.12	30.82	29.46	28.71	28.24	27.91	27.67	27.49	27.35
	0.005	55.55	49.80	47.47	46.19	45.39	44.84	44.43	44.13	43.88
	0.10	4.54	4.32	4.19	4.11	4.05	4.01	3.98	3.95	3.94
	0.05	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00
4	0.025	12.22	10.65	9.98	9.60	9.36	9.20	9.07	8.98	8.90
	0.01	21.20	18.00	16.69	15.98	15.52	15.21	14.98	14.80	14.66
	0.005	31.33	26.28	24.26	23.15	22.46	21.97	21.62	21.35	21.14
	0.10	4.06	3.78	3.62	3.52	3.45	3.40	3.37	3.34	3.32
	0.05	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77
5	0.025	10.01	8.43	7.76	7.39	7.15	6.98	6.85	6.76	6.68
	0.01	16.26	13.27	12.06	11.39	10.97	10.67	10.46	10.29	10.16
	0.005	22.78	18.31	16.53	15.56	14.94	14.51	14.20	13.96	13.77
	0.10	3.78	3.46	3.29	3.18	3.11	3.05	3.01	2.98	2.96
	0.05	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10
6	0.025	8.81	7.26	6.60	6.23	5.99	5.82	5.70	5.60	5.52
	0.01	13.75	10.92	9.78	9.15	8.75	8.47	8.26	8.10	7.98
	0.005	18.63	14.54	12.92	12.03	11.46	11.07	10.79	10.57	10.39
	0.10	3.59	3.26	3.07	2.96	2.88	2.83	2.78	2.75	2.72
	0.05	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68
7	0.025	8.07	6.54	5.89	5.52	5.29	5.12	4.99	4.90	4.82
	0.01	12.25	9.55	8.45	7.85	7.46	7.19	6.99	6.84	6.72
	0.005	16.24	12.40	10.88	10.05	9.52	9.16	8.89	8.68	8.51
	0.10	3.46	3.11	2.92	2.81	2.73	2.67	2.62	2.59	2.56
	0.05	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39
8	0.025	7.57	6.06	5.42	5.05	4.82	4.65	4.53	4.43	4.36
	0.01	11.26	8.65	7.59	7.01	6.63	6.37	6.18	6.03	5.91
	0.005	14.69	11.04	9.60	8.81	8.30	7.95	7.69	7.50	7.34

國立雲林科技大學
98學年度碩士班入學招生考試試題

系所：工管所
科目：作業研究

注意:請按照題號及子題號順序作答；不按題號順序作答不以計分。

I.問答題(共五十分)(計算過程請勿附上)

I.1 Given a Linear Programming problem in its standard form, please state how to use the simplex method to detect the following properties for the LP:
(a) infeasibility (5%)
(b) unboundedness (5%)

I.2 Given the following Integer Linear Programming problem:

$$\begin{aligned} \min\ & x_4 + x_6 \\ \text{s.t.}\ & 0.3x_1 + 0.1x_2 + x_3 = 2.7 \\ & 0.5x_1 + 0.5x_2 + x_4 = 6 \\ & 0.6x_1 + 0.4x_2 - x_5 + x_6 = 6 \\ & x_1, x_2, x_3, x_4, x_5, x_6 \in Z^+ \cup \{0\} \end{aligned}$$

The branch and bound technique is applied to solve this problem.
(a) Suppose the Simplex Method is used to solve the LP relaxation of above problem. What is the optimal solution and optimal value of the LP relaxation? (Please take x_3, x_4 and x_6 as initial basic variables to execute the simplex method by selecting the entering variable with the most negative coefficient.) (10%)
(b) Does this LP relaxation problem have multiple optimal solutions according to your solution in (a)? If your answer is "Yes", what are the other basic feasible solutions? (5%)
(c) What are the branching variable and the bound according to your answer in (a)? And what are the corresponding additional constraints to be added into the problem in this branching step? (5%)

I.3 Suppose you are using Hungarian Method to solve an Assignment problem. The following table shows the final reduced cost matrix and the required line to cover the zeros. What is the optimal assignment according to the matrix and line obtained below? (Please indicate your assignment sequence. For example, suppose you assign P5 to J5 first then assign P1 to J1, your answer, in such case, should looks like P5-J5, P1-J1) (5%)

	J1	J2	J3	J4	J5
P1	0	0	0	M	1
P2	6	0	0	4	0
P3	10	7	0	10	6
P4	0	0	M	0	1
P5	8	6	0	1	0

國立雲林科技大學
98學年度碩士班入學招生考試試題

系所：工管所
科目：作業研究

I.4 Let $G = (N, A)$ be an undirected graph, with node set $N = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$, arc set $A = \{(1,2), (1,3), (1,4), (2,3), (2,5), (3,4), (3,5), (3,6), (3,7), (3,9), (4,7), (5,9), (6,7), (6,8), (6,9), (8,9)\}$, and arc length $\{(1,2) = 5, (1,3) = 7, (1,4) = 6, (2,3) = 2, (2,5) = 4, (3,4) = 1, (3,5) = 4, (3,6) = 3, (3,7) = 8, (3,9) = 9, (4,7) = 2, (5,9) = 6, (6,7) = 4, (6,8) = 6, (6,9) = 5, (8,9) = 2\}$. Suppose we would like to find the shortest-path from node 1 to node 9.

(a) What is the condition of a given network that the Dijkstra's algorithm can be applied to find the shortest-path? (5%)

(b) What is the (permanent) node labeling sequence in the Dijkstra's algorithm for finding the shortest-path from node 1 to node 9? (10%)

II 計算題(共五十分)

II.1 Consider a service station with one server with 2 service modes, the slower mode and the faster mode. The arrival process is a Poisson process with rate 1 and the service time of the slower mode is exponential with rate 1 and the service time of the faster mode is exponential with rate 2. Whenever number of jobs in the system is less than or equal to two, the server processes job in slower mode, otherwise, it operates in faster mode.

(a) Draw the transition rate diagram? (10%)

(b) Find the steady state distribution by solving the balance equations. (20%)

II.2 Consider an *M*/*M*/1 queue with an unreliable server (machine). The state of the machine alternates between up and down irrespective of whether it is idle or is busy processing jobs. The up time of the machine is exponential with rate α. When the machine fails, it is repaired immediately (repair time is exponential with rate β), and it returns to service as soon as the repair is completed. The arrival process is a Poisson process with rate λ and service time is exponential with rate μ. The machine processes job whenever there are jobs in the system and it is up. Define the state and draw the transition rate diagram (20%).

國立雲林科技大學
98學年度碩士班入學招生考試試題

系所：工管所
科目：生產管理

1. (25%)The old forecast is 200 units, α=0.2, and actual demand for the last month is 230 units. If the seasonal index for the last month is 1.1, and the next month is 0.8, calculate:
   a. The deseasonalized actual demand for the last month. (8%)
   b. The deseasonalized forecast for the next month using exponential smoothing.(8%)
   c. The forecast of actual demand for the next month. (9%)

2. (25%) A store has collected the following information on one of its products:
   Demand = 5,000 units/year
   Standard deviation of weekly demand = 10 units
   Ordering costs = $50/order
   Holding costs = $2/unit/year
   Cycle-service level = 90% (*z* for 90% = 1.28)
   Lead-time = 2 weeks
   Number of weeks per year = 52 weeks

   a. If a firm uses the continuous review system to control the inventory, what would be the order quantity and reorder point? (12%)
   b. The firm decided to change to the periodic review system to control the item's inventory. For the most recent review, an inventory clerk checked the inventory of this item and found 200 units. There were no scheduled receipts or backorders at the time. How many units should be ordered? (13%)

3. (10%) 針對下列單機排程問題，請以動態之緊急比(critical ratio)求解排序，並試算其系統中平均之工作數為何。

工作	作業時間	到期日	工作	作業時間	到期日
1	4	18	4	4	20
2	6	24	5	8	12
3	5	14	6	2	20

4. (10%) 對於一專案管理之問題，若假設整個專案最晚完工時間為 50 天，試回答下列問題：
   a. 若該時間是以要徑法(CPM)法求得，則整個專案 50 天完工之機率為何？ (5%)
   b. 若該時間是以計劃評核術(PERT)法求得，則整個專案 50 天完工之機率為何？ (5%)

5. (15%) JIT 中採混線、小批量生產其目的為何？其配套之措施為何？其主要之理論基礎又為何？請就您個人之觀點詳細陳述之。

6. (5%) 請說明，何謂 available to promise (ATP)？

7. (10%) 在供應鏈體系中，存貨之策略可為 push 或 pull，請分別針對兩種策略可適用於何種產品特性之產品，並舉例說明之。

國立雲林科技大學
98學年度碩士班入學招生考試試題

系所：工管所、運籌所
科目：微積分

1. Express the $3.1\overline{9}$ as a fraction (分數).
2. A driver sets out on a journey. For the first half of the distance she drives at the speed of 60 mi/h; and at 40 mi/h for the second half of the distance. What is her average speed on this trip?
3. Solve the equality: $|x+1|-|x-5|=3$.
4. If $f_0(x)=x^2$ and $f_{n+1}(x)=f_0(f_n(x))$ for $n=1,2,3,\cdots$. Please find a formula for $f_n(x)$.
5. Find a number δ such that $|\sqrt{4x+1}-3|<0.4$ when $|x-2|<\delta$.
6. For the equation $x^2+xy+y^2=3$, please find the tangent line at the point (1, 1).
7. Use the linear approximation of the function $f(x)=\sqrt[3]{8+x}$ at $x=0$ to approximate the number $\sqrt[3]{6.91}$. (請算至小數點以下第四位)
8. Use Newton's method to find the root of the equation $x^4-20=0$ to x_3 with the initial solution x_1=7.
9. Find the point on the line $y=2x+3$ that is closest to the origin.
10. Find the limit $\lim_{x\to\infty}\frac{2x}{\ln(2+3e^x)}$.
11. Find the limit $\lim_{n\to\infty}(3n+e^n)^{\frac{1}{n}}$
12. Determine whether the series $\sum_{n=1}^{\infty}\ln(\frac{n}{3n+2})+(\frac{3}{5^n})$ is convergent or divergent. If it is convergent, find its sum.
13. Evaluate $\int\frac{e^x-1}{x^2}dx$ as an infinite series.
14. Find $\int_{\pi/3}^{\pi/2}\frac{1}{1+2\sin x-\cos x}dx$
15. Find $\int\frac{\ln(x-1)}{x^2}dx$
16. Find the area of the region bounded by the given curves $y=\sin x$, $y=e^x$, $x=0$ and $x=\pi/2$.
17. Let $f(x)=\int_0^x e^t\cos 2t\,dt$. Find the maximum value of $f(x)$ at $0\leqq x\leqq\pi$.
18. Solve the differential equation that satisfies the given initial condition.

$$x\frac{dy}{dx}=y+x^2\sin x,\qquad y(\pi)=0$$

19. Evaluate $\iint_R e^y\sqrt{x+e^y}\,dA$, where $R=\{0\le x\le 4, 0\le y\le 1\}$.
20. Find $\int_0^1\frac{\ln x}{\sqrt{x}}dx$.

(共 20 題，每題 5 分)

國立雲林科技大學
98學年度碩士班入學招生考試試題

系所：工管所、運籌所、健康所
科目：管理概論

一、簡答題（共十題，每一題8分）

1. 何謂企業使命（mission）？何謂企業願景（vision）？
2. 何謂 SWOT 分析？
3. 試說明 Michael Porter 之五力分析爲何？
4. 何謂差異化策略（differentiation strategy）？
5. 何謂矩陣式組織？其與一般專案組織有何不同？
6. 何謂企業流程再造（business process reengineering）？
7. 何謂目標設定理論（goal setting theory）？
8. 何謂公平理論（equity theory）？
9. 試說明費德勒（Fred E. Fielder）之情境領導模式。
10. 何謂存貨週轉率？何謂投資報酬率？

二、管理的四個功能爲規劃（planning）、組織（organizing）、領導（leading）、及控制（controlling）。試以您的工作爲例，說明您是如何運用管理四大功能於您的工作之中，有效能且有效率的完成您的工作任務。（20分）