※ 考生請注意：本試題 ☑可 ☐不可 使用計算機

1. John, the owner of Cheng-Kung Company, wants to invest in additional machinery to meet the new production demands. He discussed with his purchasing agent the anticipated cost of adding five machines of a type similar to one they had purchased the year before. These machines were versatile enough to manufacture a wide variety of parts and components. The purchasing agent reported to John that they had chosen the old machine because of its low overall cost of operation. All machines available then had been evaluated on a number of criteria. Two new companies that made similar machines claimed their machines were an even better buy. Both companies agreed to lend John one of their machines for a test of productive ability. The two machines were randomly assigned jobs of the same type. The number of parts finished by each machine was recorded at the end of each day. All partially finished items were included in the count as work in progress and counted as percent complete. The numbers of parts completed on each new machine (X and Y) were recorded. In addition, the records of the last two weeks provide the production information on the old machine (Z).

Machine X	18.3	7.5	6.1	7.3	4.5	8.5	5.9	5.1	3.6	11.9	10.5	18.9	11.1	18.6
Machine Y	13.2	10.4	8.1	9.2	10.4	7.8	9.5	7.6	8.3	5.1	13.6	12.7	10.7	13.8
Machine Z	9.5	9.9	7.7	9.8	12.3	14.3	6.7	8.1	11.3	12.5	14.9	13.8	10.4	7.4

a) Are machine X and Y equal in productive capacity? Explain. (10%)
b) How does the old machine compare with the better of the new machines in productive capacity? (10%)

2. The following data show the improvement of six students in a speed-reading program, and the number of weeks they have been in the program.

Number of weeks	3	4	1	3	5	7
Speed gain (words per minute)	65	90	22	81	132	180

a) What is the correlation between the improvement of reading speed and the number of weeks in the program? (10%)
b) What would be your predicted the gain in reading speed of a person who has been in the program for three weeks? (10%)
c) Find 0.95 limits of prediction for the gain in reading speed of a person who has been in the program for three weeks. (10%)

(背面仍有題目,請繼續作答)

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3. Give three examples to explain why a Possion random variable is usually a good approximation for the diverse phenomena. (8%)

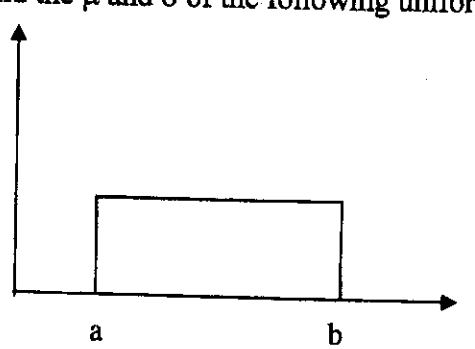
4. Briefly explain the following terms: (24%)

(1) standard error
(2) type II error
(3) Heterogenous subsamples
(4) residual variance
(5) sampling frame
(6) multicollinearity
(7) factorial design
(8) magnitude of effect

5. Give an example to explain what assumptions are necessary to use and to describe the steps to implement the following statistic in hypothesis test. (10%)

$$t' = \frac{\overline{X_1} - \overline{X_2}}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}$$

6. Find the μ and σ of the following uniform population. (8%)



系所組別： 資訊管理研究所甲組

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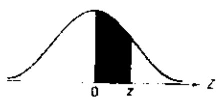
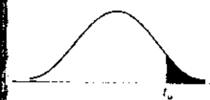
Table A-4 Areas of the Standard Normal Distribution

The entries in this table are the probabilities that a standard normal random variable is between 0 and z [illegible]



z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	[illegible]
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	[illegible]	[illegible]
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	[illegible]	[illegible]
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	[illegible]	[illegible]
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	[illegible]	[illegible]
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	[illegible]	[illegible]
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	[illegible]	[illegible]
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	[illegible]	[illegible]
0.7	0.2580	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	[illegible]
0.8	0.2881	0.2910	0.2939	0.2967	0.2995	0.3023	0.3051	0.3078	0.3106	[illegible]
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	[illegible]
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	[illegible]
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	[illegible]
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	[illegible]
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	[illegible]
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	[illegible]
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	[illegible]
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	[illegible]
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	[illegible]
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	[illegible]
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	[illegible]
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	[illegible]
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	[illegible]
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	[illegible]
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	[illegible]
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	[illegible]
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	[illegible]
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	[illegible]
3.1	0.4990	0.4991	0.4991	0.4991	0.4992	0.4992	0.4992	0.4992	0.4993	[illegible]
3.2	0.4993	0.4993	0.4994	0.4994	0.4994	0.4994	0.4994	0.4995	0.4995	[illegible]
3.3	0.4995	0.4995	0.4995	0.4996	0.4996	0.4996	0.4996	0.4996	0.4996	[illegible]
3.4	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4998
3.5	0.4998									
4.0	0.49997									
4.5	0.499997									
5.0	0.4999997									

Table A-5 Critical Values of *t*



DEGREES OF FREEDOM	$t_{.100}$	$t_{.050}$	$t_{.025}$	$t_{.010}$	$t_{.005}$
1	3.078	6.314	12.706	31.821	63.657
2	1.886	2.920	4.303	6.965	9.925
3	1.638	2.353	3.182	4.541	5.841
4	1.533	2.132	2.776	3.747	4.604
5	1.476	2.015	2.571	3.365	4.032
6	1.440	1.943	2.447	3.143	3.707
7	1.415	1.895	2.365	2.998	3.499
8	1.397	1.860	2.306	2.896	3.355
9	1.383	1.833	2.262	2.821	3.250
10	1.372	1.812	2.228	2.764	3.169
11	1.363	1.796	2.201	2.718	3.106
12	1.356	1.782	2.179	2.681	3.055
13	1.350	1.771	2.160	2.650	3.012
14	1.345	1.761	2.145	2.624	2.977
15	1.341	1.753	2.131	2.602	2.947
16	1.337	1.746	2.120	2.583	2.921
17	1.333	1.740	2.110	2.567	2.898
18	1.330	1.734	2.101	2.552	2.878
19	1.328	1.729	2.093	2.539	2.861
20	1.325	1.725	2.086	2.528	2.845
21	1.323	1.721	2.080	2.518	2.831
22	1.321	1.717	2.074	2.508	2.819
23	1.319	1.714	2.069	2.500	2.807
24	1.318	1.711	2.064	2.492	2.797
25	1.316	1.708	2.060	2.485	2.787
26	1.315	1.706	2.056	2.479	2.779
27	1.314	1.703	2.052	2.473	2.771
28	1.313	1.701	2.048	2.467	2.763
29	1.311	1.699	2.045	2.462	2.756
30	1.310	1.697	2.042	2.457	2.750
40	1.303	1.684	2.021	2.423	2.704
60	1.296	1.671	2.000	2.390	2.660
120	1.289	1.658	1.980	2.358	2.617
∞	1.282	1.645	1.960	2.326	2.576