國立成功大學 104 學年度碩士班招生考試試題

系所組別：工業設計學系甲組

考試科目：統計方法

考試日期：0211，節次：3

※ 考生請注意：本試題不可使用計算機。 請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

Part 1: Multiple choice questions (35pts)

1. Describe the relationship for the following pairs of observations. (5pts)

X	Y
6	118
12	109
3	144
10	111
1	142

a) positive
b) negative
c) little or no relationship
d) impossible to describe

2. A positive *r* reflects the tendency for pairs of observations to occupy (5pts)
a) similar locations in their respective distributions.
b) dissimilar and opposite locations in their respective distributions.
c) similar relative locations in their respective distributions.
d) dissimilar and opposite relative locations in their respective distributions.

3. If the null hypothesis is false because of a large effect, the probability of a correct decision (5pts)
a) will be relatively large.
b) will be relatively small.
c) will equal one minus the level of significance.
d) will equal one minus the probability that the null hypothesis is false.

4. Kate has 10 socks in one drawer (3 red, 4 blue, 2 yellow, 1 white) and 10 socks in another drawer (1 red, 4 blue, 2 yellow, 3 white). If she selects one sock from each drawer without looking, what is the probability that both will be red? (5pts)
a) 0.01
b) 0.03
c) 0.04
d) 0.40

5. In a statistics class, the probability of a grade of either A or B is equal to .50, and the probability of a grade of C is equal to .30. Thus, the probability of either an A, B or C is equal to (5pts)
a) 0.2
b) 0.3
c) 0.5
d) 0.8

6. Which type of graph would best depict a student's scores on monthly math tests over the past two years? (5pts)
a) Frequency polygon
b) Pie chart
c) Scatterplot
d) Bar chart

7. If the amount of variation in height that is associated with variation in weight is 49%, the correlation between these variables will be (5pts)
   a) 0.07
   b) 0.49
   c) 0.70
   d) indeterminate

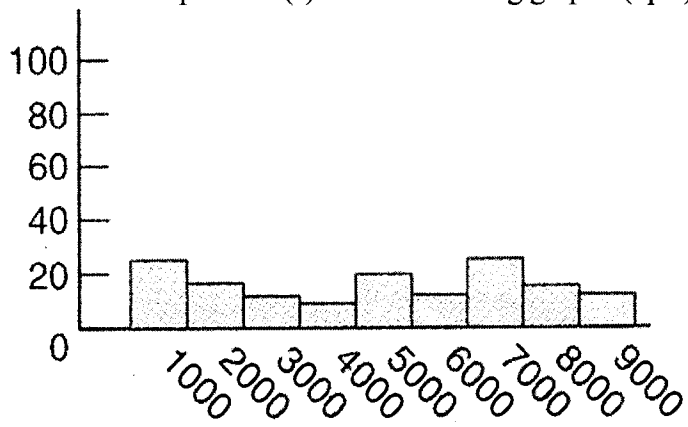
Part 2: Short answer questions (65pts)

1. Describe the difference between a random variable and a discrete random variable. (5pts)

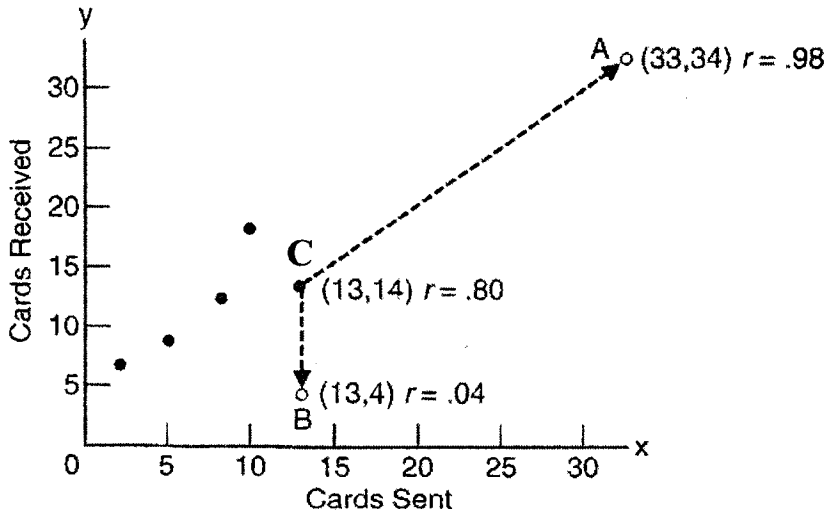
2. Describe the purpose and the procedure of a hypothesis testing. (5pts)

3. What are the assumptions for t test of 2 independent samples? If these assumptions are violated, what needs to be concerned with? (10 pts)

4. What is/are the problem(s) of the following graph? (5pts)



5. For the following graph, explain why replacing C with B would decrease the value of r, while replacing C with A would increase the value of r? (5pts)



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6. The blood pressure of 18-year-old women is normallydistributed with a mean of 120 mmHg and a standard deviation of 12mmHg. What percentage of 18-year-old women have a blood pressure that lies within 3 standard deviations to either side of the mean? (5pts)

7. John developed a new medicine. He conducted an experiment with his friends to test the effectiveness of his medicine with the placebo. He obtained the following data. Please calculate the observed t value (assuming the two population variances are equal). (10 pts)

John's medicine	**Placebo**
12	7
5	3
11	4
11	6
9	3
18	13

8. The following table shows the number of exercises (x) John does in relation to his weight in pounds (y).

x	1	3	5	7	9
y	143	116	100	98	90

(1) Prepare a scatter plot for the above data. (5pts).

(2) Calculate the correlation coefficient for the 2 variables (5pts).

(3) Determine the least squares regression equation for these data (5pts).

(4) Determine the average amount of predictive error, $S_{y|x}$ (5pts).

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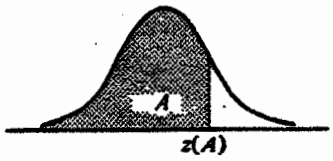
TABLE B.1 Cumulative Probabilities of the Standard Normal Distribution.

Entry is area A under the standard normal curve from $-\infty$ to $z(A)$



z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
.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	.9279	.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