

# 國立臺北科技大學

九十三年學年度商業自動化與管理研究所入學考試

## 統計學試題

填准考證號碼

第一頁 共二頁

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### 注意事項：

1. 本試題共六題，配分共 100 分。
2. 請按順序標明題號作答，不必抄題。
3. 全部答案均須答在答案卷之答案欄內，否則不予計分。

一、 Each question 3 points. (30 points)

1. A normal curve is determined completely by the \_\_\_\_\_ and \_\_\_\_\_.
2. The area under the unit normal curve from  $-Z_0$  to 0 is 1/2 the area from \_\_\_\_\_.
3. How many small private passenger car license plates are possible, in Taiwan?  
\_\_\_\_\_.
4. Given the data: 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 10 the best measure of the "average" is the \_\_\_\_\_.
5. Given the formula for the variance of a random variable X,  $\sigma^2 = \sum (x_i - \mu)^2 p(x_i)$ , if X denotes the number of heads counted when a coin is tossed 50 times, then when  $x = 0$ ,  $p(x) =$  \_\_\_\_\_.
6. A histogram depicting a probability function consists of rectangles, each with an area \_\_\_\_\_.
7. If X is a binominal random variable, then  $\sigma^2 = np(1 - p)$ . If X denotes the number of "ones" counted when a die is thrown 100 times, then  $1 - p =$  \_\_\_\_\_.
8. To determine the sample mean of grouped data, determine each interval's midpoint and find \_\_\_\_\_.
9.  $p(|z| \leq 2) =$  \_\_\_\_\_.
10. In a situation where  $\mu = 40$  and  $\sigma = 10$ , converting to a problem for the unit normal distribution for  $x = 60$  would result in  $z =$  \_\_\_\_\_.

- 二、 In a medical study, a researcher wished to estimate the average length of time needed for a particular nurse-in-training to draw a series of blood specimens. A sample of the nurse's work over several months yielded the following times: 10, 6, 5, 14, 6, and 13 (in minutes). (20 points)
- What is the population?
  - What is it about the population we wish to determine? And what symbol is used to represent this?
  - What is the sample? Calculate average.
  - Is this sample representative of the population? Discuss:
    - Randomness.
    - Internal validity.
    - External validity.
    - Sample size.

- 三、 A West Coast professor's definition of good "empathy, meaning regards for the needs, rights, and ability to act with reference to the more distant consequences of current behavior." Suppose a test evaluating good character was administered to twenty-one local politicians, resulting in the following scores (10 – 49 scale): (20 points)

18 26 23 21 26 29 30 33 32 34 38 38 36 37 41 40 47 41 42 43

- Construct both a tally and a pictogram (invent your own symbol) using the following categories: 10-19, 20-29, 30-39, and 40-49.
  - Construct a stem-and-leaf display.
  - Construct a box-and-whisker plot.
  - Locate the quartile points,  $Q_1$ ,  $Q_2$ , and  $Q_3$ .
- 四、 Brell shampoo, an "in-house" brand, is marketed through a large national chain of convenience stores. This chain also carries other national brands of shampoo. Brell's in-house market share is  $\mu = 24.0$  with standard deviation 3.2. (10 points)
- Suppose we enlarge an average 23.1 to average 24.9 as our cutoffs for accepting  $\mu = 24.0$ , what effect would this have on our Type I and Type II error risks and on power?
  - Recommend a way to decrease both your Type I and Type II error risks.

五、 Elavil is a powerful sedating drug prescribed by psychiatrists for the treatment of depression; however, dosages must be minimized to reduce side effects. A leading health organization claims the minimum effective dosage nationwide is on average 140.0mg/day or less. A manufacturer of the drug decides to test the claim with the following sample results: ( 10points )

Sample size = 900 patients

Sample average = 141.6 mg/day minimum effective dosage

Sample standard deviation = 48.2 mg/day

- a、 Test the health organization's claim at  $\alpha = 0.04$
- b、 Are the results "significant"? Do we have evidence to refute the health organization's claim?

六、 Explain what is your opinions for the following Cartoon. ( 10 points )





# Statistical Tables

Normal										
z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517	.2549
0.7	.2580	.2611	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990
3.1	.4990	.4991	.4991	.4991	.4992	.4992	.4992	.4992	.4993	.4993
3.2	.4993	.4993	.4994	.4994	.4994	.4994	.4994	.4995	.4995	.4995
3.3	.4995	.4995	.4996	.4996	.4996	.4996	.4996	.4996	.4996	.4997
3.4	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4998	.4998
3.5	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998

The normal curve table gives only the percentage of data starting from the middle ( $z = 0$ ), out to whatever  $z$  score you look up. For instance, if you look up  $z = 1.28$ , you get .3997. This means .3997 or 39.97% of the data in the normal curve is found between  $z = 0$  and  $z = 1.28$ .

