

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

一、單選題：(56%)：每題 4 分，答錯倒扣 1 分

1. Some hotels ask their guests to rate the hotel's services as excellent, very good, good, and poor. This is an example of the
    - (A) ordinal scale
    - (B) ratio scale
    - (C) nominal scale
    - (D) interval scale
  2. A statistics professor asked students in a class their ages. On the basis of this information, the professor states that the average age of all the students in the university is 24 years. This is an example of
    - (A) a census
    - (B) descriptive statistics
    - (C) an experiment
    - (D) statistical inference
- Data:** A researcher has collected the following sample data: 5, 12, 6, 8, 5, 6, 7, 5, 12, 4.
3. Refer to above data. The mode is
    - (A) 5
    - (B) 6
    - (C) 7
    - (D) 8
  4. Refer to above data. The 75th percentile is
    - (A) 5
    - (B) 6
    - (C) 7
    - (D) 8
  5. For the interval estimation of  $\mu$  when  $\sigma$  is known and the sample is large, the proper distribution to use is
    - (A) the normal distribution
    - (B) the t distribution with n degrees of freedom
    - (C) the t distribution with n + 1 degrees of freedom
    - (D) the t distribution with n + 2 degrees of freedom
  6. In interval estimation, the t distribution is applicable only when
    - (A) the population has a mean of less than 30
    - (B) the sample standard deviation is used to estimate the population standard deviation
    - (C) the variance of the population is known
    - (D) the standard deviation of the population is known

7. Using an  $\alpha = 0.04$  a confidence interval for a population proportion is determined to be 0.65 to 0.75. If the level of significance is decreased, the interval for the population proportion
- (A) becomes narrower
  - (B) becomes wider
  - (C) does not change
  - (D) remains the same
8. The  $p$ -value is a probability that measures the support (or lack of support) for the
- (A) null hypothesis
  - (B) alternative hypothesis
  - (C) either the null or the alternative hypothesis
  - (D) sample statistic
9. A Type II error is committed when
- (A) a true alternative hypothesis is mistakenly rejected
  - (B) a true null hypothesis is mistakenly rejected
  - (C) the sample size has been too small
  - (D) not enough information has been available
10. If the probability of a Type I error ( $\alpha$ ) is 0.05, then the probability of a Type II error ( $\beta$ ) must be
- (A) 0.05
  - (B) 0.95
  - (C) 0.025
  - (D) None of these alternatives is correct.
11. We are interested in conducting a study in order to determine what percentage of voters in a city would vote for the incumbent mayor. What is the minimum size sample needed to estimate the population proportion with a margin of error not exceeding 4% at 95% confidence?
- (A) 625
  - (B) 626
  - (C) 600
  - (D) 601
12. Independent simple random samples are taken to test the difference between the means of two populations whose variances are not known, but are assumed to be equal. The sample sizes are  $n_1 = 32$  and  $n_2 = 40$ . The correct distribution to use is the
- (A)  $t$  distribution with 73 degrees of freedom
  - (B)  $t$  distribution with 72 degrees of freedom
  - (C)  $t$  distribution with 71 degrees of freedom
  - (D)  $t$  distribution with 70 degrees of freedom

13. The sampling distribution for a goodness of fit test is the
- (A) Poisson distribution  
 (B)  $t$  distribution  
 (C) normal distribution  
 (D) chi-square distribution
14. A goodness of fit test is always conducted as a
- (A) lower-tail test  
 (B) upper-tail test  
 (C) middle test  
 (D) None of these alternatives is correct.

二、問答題 (44%，需列出計算式)

1. (8%) A government agency has 6,000 employees. The employees were asked whether they preferred a four-day work week (10 hours per day), a five-day work week (8 hours per day), or flexible hours. You are given information on the employees' responses broken down by sex as follows.

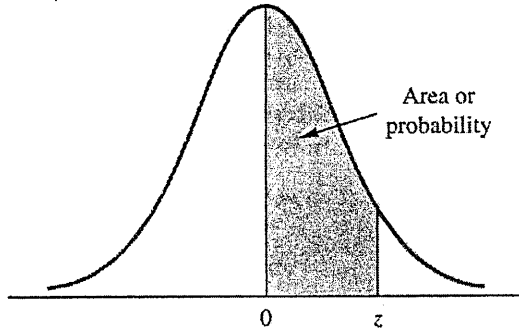
	Male	Female	Total
Four-days	300	600	900
Five-days	1,200	1,500	2,700
Flexible	300	2,100	2,400
Total	1,800	4,200	6,000

- (a) A randomly selected employee turns out to be female. Compute the probability that she is in favor of flexible hours.
- (b) Given that a person is in favor of flexible time, what is the probability that the person is female?
2. (8%) Forty percent of all registered voters in a national election are female. A random sample of 5 voters is selected.
- (a) What is the probability that the sample contains 2 female voters?  
 (b) What is the probability that there are no females in the sample?
3. (8%) The travel time for a college student traveling between her home and her college is uniformly distributed between 40 and 90 minutes.
- (a) What is the probability that she will finish her trip in 80 minutes or less?  
 (b) What is the probability that her trip will take longer than 60 minutes?
4. (8%) In a local university, 40% of the students live in the dormitories. A random sample of 80 students is selected for a particular study.
- (a) What is the approximately standard deviation of  $\bar{p}$ , known as the standard error of the proportion?  
 (b) What is the probability that the sample proportion (the proportion living in the dormitories) is between 0.30 and 0.50?
5. (8%) In a population a variable  $X$  takes only three distinct values:  $-1$  with probability  $P_1 = 1/8$ ;  $0$  with  $P_2 = 3/4$ ; and  $+1$  with  $P_3 = 1/8$ . Calculate  $\mu$  and  $\sigma$ .

6. (4%) The manager of an automobile dealership is considering a new bonus plan in order to increase sales. Currently, the mean sales rate per salesperson is five automobiles per month. What is the correct set of hypotheses for testing the effect of the bonus plan?

附件：Normal distribution

TABLE I STANDARD NORMAL DISTRIBUTION



Entries in the table give the area under the curve between the mean and  $z$  standard deviations above the mean. For example, for  $z = 1.25$  the area under the curve between the mean and  $z$  is .3944.

$z$	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517	.2549
.7	.2580	.2611	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
.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