國立高雄應用科技大學
101 學年度碩士班招生考試
企業管理系

准考證號碼□□□□□□□□□□　（考生必須填寫）

統計學

試題　共 5 頁，第 1 頁

注意：a. 本試題共三大題，共 100 分。
b. 作答時不必抄題。
c. 答案必須依題號順序(填充題依空格編號)標示清楚寫在**答案卷**上，寫在試題卷上不予計分。
d. 可使用非程式型之計算器。
e. 填充題和計算題全部**使用小數**，計算題過程需明列，只寫答案不予計分。
f. 所需值表列於試題後。考完請將答案卷及試題一併繳回。

一、單選題 20%

1. A graphical presentation of the relationship between two variables is
a. an ogive　b. a histogram　c. either an ogive or a histogram, depending on the type of data　d. a scatter diagram

2. Temperature is an example of a variable that uses
a. the ratio scale　b. the interval scale　c. the ordinal scale　d. either the ratio or the ordinal scale

3.The median of a sample will always equal the
a. mode　b. mean　c. 50th percentile　d. all of the above are correct

4. Bayes' theorem is used to compute
a. the prior probabilities　b. the union of events　c. intersection of events　d. the posterior probabilities

5. When sampling without replacement, the probability of obtaining a certain sample is best given by a
a. hypergeometric distribution　b. binomial distribution　c. Poisson distribution　d. normal distribution

6. Which of the following is not a characteristic of the normal probability distribution?

a. The mean, median, and the mode are equal　b. The mean of the distribution can be negative, zero, or positive　c. The distribution is symmetrical　d. The standard deviation must be 1

7. As the sample size increases, the
   a. standard deviation of the population decreases　b. population mean increases
   c. standard error of the mean decreases　d. standard error of the mean increases
8. A property of a point estimator that occurs whenever larger sample sizes tend to provide point estimates closer to the population parameter is known as
   a. efficiency　b. unbiased sampling　c. consistency　d. relative estimation
9. A sample of 92 observations is taken from an infinite population. The sampling distribution of $\bar{x}$ is approximately
   a. normal because $\bar{x}$ is always approximately normally distributed　b. normal because the sample size is small in comparison to the population size　c. normal because of the central limit theorem　d. None of these alternatives is correct.
10. Whenever the population standard deviation is unknown and the population has a normal or near-normal distribution, which distribution is used in developing an interval estimation?
    a. standard distribution　b. z distribution　c. beta distribution　d. t distribution

二、填充題 45%

1. You are given the following information on Events A, B, C, and D.

   $P(A) = 0.4$　$P(B) = 0.2$　$P(C) = 0.1$　$P(A \cup D) = 0.6$　$P(A \cap D) = 0.03$
   $P(A \mid B) = 0.3$　$P(A \cap C) = 0.04$

   a. $P(D) =$ ___(1)___.　b. $P(A \cap B) =$ ___(2)___.

   c. $P(A \mid C) =$ ___(3)___.　d. the complement of C= ___(4)___.

   e. Are A and C mutually exclusive or/and independent? ___(5)___.

2. Forty percent of all registered voters in a national election are female. A random sample of 5 voters is selected.
   a. The probability that the sample contains 2 female voters is ___(6)___.
   b. The probability that there are no females in the sample is___(7)___.
3. The random variable x is the number of occurrences of an event over an interval of 10 minutes. It can be assumed that the probability of an occurrence is the same in any two time periods of an equal length. It is known that the mean number of occurrences in ten minutes is 6.
   a. What does the probability distribution of the random variable x satisfies?___(8)___.
   b. What is the probability that there are 8 occurrences in 10 minutes?___(9)___.
   c. What is the probability that there are less than 2 occurrences in 5 minutes?__(10)__.

4. The miles-per-gallon obtained by the 1995 model Z cars is normally distributed with a mean of 22 miles-per-gallon and a standard deviation of 5 miles-per-gallon.
   a. What is the probability that a car will get 13.35 to 35.1 miles-per-gallon? (11) .
   b. What is the probability that a car will get more than 29.6 miles-per-gallon? (12) .
   c. What is the probability that a car will get exactly 22 miles-per-gallon? (13) .
5. Given below are five observations collected in a regression study on two variables x (independent variable) and y (dependent variable).

x	**y**
10	7
20	5
30	4
40	2
50	1

   a. Develop the least squares estimated regression equation. (14) .
   b. Compute the coefficient of determination. (15) .

三、計算題 35%

1. (10%) A sample of 150 individuals (males and females) was surveyed, and the individuals were asked to indicate their yearly incomes. The results of the survey are shown below.

Income Category	**Male**	**Female**
$20,000 up to $40,000	10	30
$40,000 up to $60,000	35	15
$60,000 up to $80,000	15	45

   Test at $\alpha = 0.05$ to determine if the yearly income is independent of the gender.

2. (10%) The management of Recover Fast Hospital (RFH) claims that the average length of stay in their hospital after a major surgery is less than the average length of stay at General Hospital (GH). The following data has been accumulated to test their claim. Assume the two populations are normally distributed and have equal variances. Test to see if the average length of stay in RFH is significantly less than the average length of stay in GH. Let $\alpha = 0.05$.

	RFH	**GH**
Sample size	16	26
Mean (in days)	4	5
Std. Deviation	0.5	0.75

3. (15%) The marketing department of a company has designed three different boxes for its product. It wants to determine which box will produce the largest amount of sales. Each box will be test marketed in five different stores for a period of a month. Below you are given the information on sales.

	Store 1	**Store 2**	**Store 3**	**Store 4**	**Store 5**
Box 1	210	230	190	180	190
Box 2	195	170	200	190	193
Box 3	295	275	290	275	265

a. Construct an ANOVA table.

b. State the null and alternative hypotheses. What conclusion do you draw?

Note: $\chi^2_{1,0.05} = 3.8415$, $\chi^2_{2,0.05} = 5.9915$, $\chi^2_{3,0.05} = 7.8147$, $\chi^2_{4,0.05} = 9.4877$

$F_{1,8,0.05} = 5.3177$, $F_{2,8,0.05} = 4.4590$, $F_{3,8,0.05} = 4.0662$, $F_{4,8,0.05} = 3.8379$

$t_{15,0.05} = 1.7531$, $t_{25,0.05} = 1.7081$, $t_{40,0.05} = 1.6839$, $t_{15,0.025} = 2.1314$

$t_{25,0.025} = 2.0595$ $t_{40,0.025} = 2.0211$

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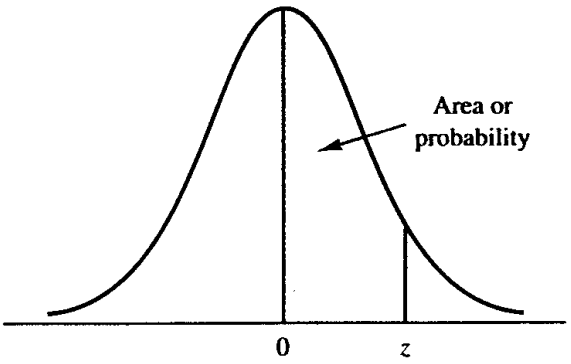

Entries in the table give the area under the curve between the mean and z standard deviations above the mean. For example, for $z = 1.25$ the area under the curve between the mean and z is .3944.

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	.2518	.2549
.7	.2580	.2612	.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	.4986	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990