國立成功大學

113學年度碩士班招生考試試題

編　號：188

系　所：製造資訊與系統研究所

科　目：統計方法

日　期：0201

節　次：第 1 節

備　註：可使用計算機

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※ 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：(52%)：每題 4 分，答錯倒扣 1 分

1. 假設每天從台南到台北搭乘飛機之旅客平均重量為163磅，標準差為18磅，若旅客36人搭乘同一飛機旅行，則旅客總重量超過6000磅之機率(p)為何？
   a. $p < 10\%$
   b. $10\% \leqq p < 14\%$
   c. $14\% \leqq p < 18\%$
   d. $18\% \leqq p$
2. 某一工具製造商估計其車床刀具之調整得當機率為0.85，且當車床刀具調整得宜時，其產品通過檢驗之機率為0.95；但當車床刀具調整失當時，則產品之合格機率降為0.25。試問若吾人隨機選取一樣本發現其為不合格，則此時車床刀具調整失當之機率(p)為何？
   a. $p < 0.40$
   b. $0.40 \leqq p < 0.50$
   c. $0.50 \leqq p < 0.60$
   d. $0.60 \leqq p$
3. 若隨機變數X及Y均呈常態分配，且X和Y獨立，則X-Y之變異數為：
   a. $\sigma_x^2 + \sigma_y^2$
   b. $\sigma_x^2 - \sigma_y^2$
   c. $\sqrt{\sigma_x^2 + \sigma_y^2}$
   d. $\sqrt{\sigma_x^2 - \sigma_y^2}$
4. 若一產品之規格要求為每包200±5g，今欲瞭解製程之品質能力，隨機抽取25組樣本，每組4個，經測重得樣本平均數為201g、樣本標準差為2.5g，請計算C_{pk}為多少？
   a. $C_{pk} < 0.20$
   b. $0.20 \leqq C_{pk} < 0.60$
   c. $0.60 \leqq C_{pk} < 0.80$
   d. $0.80 \leqq C_{pk}$
5. 今將三個承軸組裝在一起，每一承軸之長度分配如下：承軸一：$N(75, 0.09)$cm、承軸二：$N(60, 0.16)$cm、承軸三：$N(25, 0.25)$cm，組裝後之長度超過160.5公分之機率(p)為何？
   a. $p < 30\%$
   b. $30\% \leqq p < 35\%$
   c. $35\% \leqq p < 40\%$
   d. $40\% \leqq p$
6. The ANOVA procedure is a statistical approach for determining whether or not
   a. the means of two samples are equal
   b. the means of two or more samples are equal
   c. the means of more than two samples are equal
   d. the means of two or more populations are equal
7. An experimental design where the experimental units are randomly assigned to the treatments is known as
   a. factor block design
   b. random factor design
   c. completely randomized design
   d. None of these alternatives is correct.

8. Part of an ANOVA table is shown below. The number of degrees of freedom corresponding to within treatments is:

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	F
Between Treatments	64			8
Within Treatments			2	
Error				
Total	100			

a. 22
b. 4
c. 5
d. 18

9. Each customer entering a department store will either buy or not buy some merchandise. An experiment consists of following 4 customers and determining whether or not they purchase any merchandise. How many sample points exist in the above experiment? (Note that each customer is either a purchaser or non-purchaser.)
a. 2
b. 4
c. 12
d. 16

10. If P(A) = 0.7, P(B) = 0.6, $P(A \cap B) = 0$, then events A and B are
a. not mutually exclusive
b. mutually exclusive
c. independent events
d. complements of each other

11. A probability distribution showing the probability of x successes in n trials, where the probability of success does not change from trial to trial, is termed a
a. uniform probability distribution
b. binomial probability distribution
c. hypergeometric probability distribution
d. normal probability distribution

12. The number of electrical outages in a city varies from day to day. Assume that the number of electrical outages (x) in the city has the following probability distribution.

x	$f(x)$
0	0.80
1	0.15
2	0.04
3	0.01

The mean and the standard deviation for the number of electrical outages (respectively) are
a. 2.6 and 5.77
b. 0.26 and 0.577
c. 3 and 0.01
d. 0 and 0.8

13. Assume that you have a binomial experiment with $p = 0.5$ and a sample size of 100. The expected value of this distribution is
a. 0.50
b. 0.30

c. 100
d. 50

二、單選題：(48%)：每題 3 分，答錯倒扣 0.7 分

1. The random variable x is the number of occurrences of an event over an interval of ten 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 5.3. Then, the probability that there are less than 3 occurrences in ten minutes is
   a. .0659
   b. .0948
   c. .1016
   d. .1239
2. A simple random sample of 144 observations was taken from a large population. The sample mean and the standard deviation were determined to be 1,234 and 120 respectively. The standard error of the mean is
   a. 1,234±120
   b. 120
   c. 120*12=1,440
   d. 10
3. Since the sample size is always smaller than the size of the population, the sample mean
   a. must always be smaller than the population mean
   b. must be larger than the population mean
   c. must be equal to the population mean
   d. can be smaller, larger, or equal to the population mean
4. A population has a mean of 75 and a standard deviation of 8. A random sample of 800 is selected. The expected value of $\bar{x}$ is
   a. 8
   b. 75
   c. 800
   d. None of these alternatives is correct.
5. A sample of 24 observations is taken from a population that has 150 elements. The sampling distribution of $\bar{x}$ is
   a. approximately normal because $\bar{x}$ is always approximately normally distributed
   b. approximately normal because the sample size is large in comparison to the population size
   c. approximately normal because of the central limit theorem
   d. normal if the population is normally distributed
6. Doubling the size of the sample will
   a. reduce the standard error of the mean to one-half its current value
   b. reduce the standard error of the mean to approximately 70% of its current value
   c. have no effect on the standard error of the mean
   d. double the standard error of the mean
7. In order to use the normal distribution for interval estimation of μ when σ is known and the sample is very small, the population
   a. must be very large
   b. must have a normal distribution
   c. can have any distribution
   d. must have a mean of at least 1

8. A 95% confidence interval for a population mean is determined to be 100 to 120. If the confidence coefficient is reduced to 0.90, the interval for μ
   a. becomes narrower
   b. becomes wider
   c. does not change
   d. becomes 0.1
9. It is known that the variance of a population equals 1,936. A random sample of 121 has been taken from the population. There is a .95 probability that the sample mean will provide a margin of error of
   a. 7.84
   b. 31.36
   c. 344.96
   d. 1,936
10. In hypothesis testing if the null hypothesis has been rejected when the alternative hypothesis has been true,
   a. a Type I error has been committed
   b. a Type II error has been committed
   c. either a Type I or Type II error has been committed
   d. the correct decision has been made
11. For a lower bounds one-tailed test, the test statistic z is determined to be zero. The p-value for this test is
   a. zero
   b. -0.5
   c. +0.5
   d. 1.00
12. If the level of significance of a hypothesis test is raised from .01 to .05, the probability of a Type II error
   a. will also increase from .01 to .05
   b. will not change
   c. will decrease
   d. will increase
13. The average monthly rent for one-bedroom apartments in Houston has been $700. Because of the downturn in the real estate market, it is believed that there has been a decrease in the average rental. The correct hypotheses to be tested are
   a. H_0: $\mu \geq 700$ H_a: $\mu < 700$
   b. H_0: $\mu = 700$ H_a: $\mu \neq 700$
   c. H_0: $\mu > 700$ H_a: $\mu \leq 700$
   d. H_0: $\mu < 700$ H_a: $\mu \geq 700$
14. To compute an interval estimate for the difference between the means of two populations, the t distribution
   a. is restricted to small sample situations
   b. is not restricted to small sample situations
   c. can be applied when the populations have equal means
   d. None of these alternatives is correct.
15. If the coefficient of determination is a positive value, then the coefficient of correlation
   a. must also be positive
   b. must be zero
   c. can be either negative or positive
   d. must be larger than 1

國立成功大學 113 學年度碩士班招生考試試題

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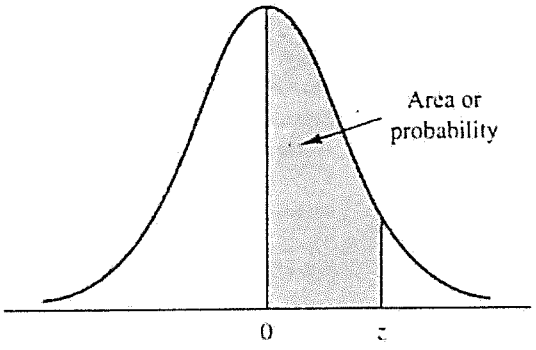
考試科目：統計方法

考試日期：0201，節次：1

16. In a regression analysis, the coefficient of determination is 0.4225. The coefficient of correlation in this situation is
    a. 0.65
    b. 0.1785
    c. any positive value
    d. any value

附表

TABLE 1 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

國立成功大學 113 學年度碩士班招生考試試題

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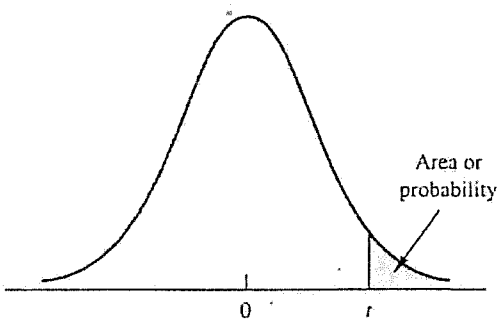
考試科目：統計方法

考試日期：0201，節次：1

TABLE 2 t DISTRIBUTION



Entries in the table give t values for an area or probability in the upper tail of the t distribution. For example, with 10 degrees of freedom and a .05 area in the upper tail, $t_{.05} = 1.812$.

Degrees of Freedom	Area in Upper Tail					
	.20	.10	.05	.025	.01	.005
1	1.376	3.078	6.314	12.706	31.821	63.656
2	1.061	1.886	2.920	4.303	6.965	9.925
3	.978	1.638	2.353	3.182	4.541	5.841
4	.941	1.533	2.132	2.776	3.747	4.604
5	.920	1.476	2.015	2.571	3.365	4.032
6	.906	1.440	1.943	2.447	3.143	3.707
7	.896	1.415	1.895	2.365	2.998	3.499
8	.889	1.397	1.860	2.306	2.896	3.355
9	.883	1.383	1.833	2.262	2.821	3.250
10	.879	1.372	1.812	2.228	2.764	3.169
11	.876	1.363	1.796	2.201	2.718	3.106
12	.873	1.356	1.782	2.179	2.681	3.055
13	.870	1.350	1.771	2.160	2.650	3.012
14	.868	1.345	1.761	2.145	2.624	2.977
15	.866	1.341	1.753	2.131	2.602	2.947
16	.865	1.337	1.746	2.120	2.583	2.921
17	.863	1.333	1.740	2.110	2.567	2.898
18	.862	1.330	1.734	2.101	2.552	2.878
19	.861	1.328	1.729	2.093	2.539	2.861
20	.860	1.325	1.725	2.086	2.528	2.845
21	.859	1.323	1.721	2.080	2.518	2.831
22	.858	1.321	1.717	2.074	2.508	2.819
23	.858	1.319	1.714	2.069	2.500	2.807
24	.857	1.318	1.711	2.064	2.492	2.797
25	.856	1.316	1.708	2.060	2.485	2.787
26	.856	1.315	1.706	2.056	2.479	2.779
27	.855	1.314	1.703	2.052	2.473	2.771
28	.855	1.313	1.701	2.048	2.467	2.763
29	.854	1.311	1.699	2.045	2.462	2.756
30	.854	1.310	1.697	2.042	2.457	2.750
31	.853	1.309	1.696	2.040	2.453	2.744
32	.853	1.309	1.694	2.037	2.449	2.738
33	.853	1.308	1.692	2.035	2.445	2.733
34	.852	1.307	1.691	2.032	2.441	2.728