

朝陽科技大學 97 學年度碩士班招生考試試題

系(所)別: 財務金融系、企業管理系、保險金融管理系
 組別: 一般生、企管系甲組
 科目: 統計學

總分: 100 分

第 1 頁共 5 頁

第一部分: 單選題 (請選擇您認為最適當的答案, 每題 3 分, 共計 60 分。)

- The unemployment rate is often used as an indicator of a community's economic vitality. An unemployment rate is best described as what level of measurement?
 (A) nominal (B) ordinal (C) interval (D) ratio
- A statistics instructor collects information about the background of his students. About 55% have taken economics and about 45% have taken accounting. There are 23 male students and 27 female students in this class. This is an example of _____.
 (A) descriptive statistics (B) inferential statistics
 (C) nonparametric statistics (D) nominal data
- The probability of a "1" on a fair toss of a fair die is $1/6$. This is an example of assigning probabilities by the _____ method.
 (A) subjective probability (B) relative frequency
 (C) classical probability (D) empirical probability
- Given $P(A) = 0.25$, $P(B) = 0.40$, $P(A|B) = 0.10$. What is $P(B|A)$?
 (A) 0.16 (B) 0.25 (C) 0.55 (D) 0.65
- Given $P(A) = 0.20$, $P(B) = 0.25$, $P(A|B) = 0.20$. Which of the following is true?
 (A) A and B are independent (B) A and B are mutually exclusive
 (C) A and B are collectively exhaustive (D) A and B are not independent
- If X is the number of successes in an independent series of 20 Bernoulli trials, then X has a _____ distribution.
 (A) hypergeometric (B) Poisson (C) normal (D) binomial
- The Poisson distribution focuses on the number of discrete occurrences _____.
 (A) in "n" trials
 (B) over some interval
 (C) in "n" trials where sampling is done without replacement
 (D) in a Bernoulli trial
- Let X be a binomial random variable with $n=30$ and $p=0.5$. If we use the normal distribution to approximate probabilities for this, we would use a mean of
 (A) 30 (B) 15 (C) 7.5 (D) 8
- If arrivals at a bank follow a Poisson distribution with the mean λ , then the time between arrivals would be
 (A) normally distributed (B) exponentially distributed
 (C) a binomial distribution (D) equal to λ

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10. A unimodal distribution that is skewed to the right has mode of \$16 and a mean value of \$19. Which of the following is a possible value for the median?
 (A) \$20 (B) \$14 (C) \$18 (D) \$25
11. In a Calculus class there are 11 freshmen and 15 sophomores; 5 of the sophomores are females, and 8 of the freshmen are males. If a student is selected at random. What is the probability of selecting a sophomore or a male?
 (A) 3/26 (B) 10/26 (C) 12/26 (D) 23/26
12. The random variable X represents the total flight time of an airplane traveling from Taipei to Okinawa. Suppose X has a uniform probability distribution. Its probability density function is
- $$f(x) = \begin{cases} 1/20 & \text{for } 120 \leq x \leq 140 \\ 0 & \text{elsewhere} \end{cases}$$
- The variance of X is closest to?
 (A) 20 (B) 10 (C) 130 (D) 33.33
13. Considering the hypothesis test, $H_0: u \geq u_0$ v.s. $H_1: u < u_0$, when the sample size n becomes larger and the other conditions are invariable, find the correct statement as follows.
 (A) The probabilities both of type I error and type II error become larger.
 (B) The probabilities both of type I error and type II error become smaller.
 (C) The probability of type I error becomes larger, the probability of type II error becomes smaller.
 (D) The probability of type I error becomes smaller; the probability of type II error becomes larger.
14. Control sampling error to satisfy $P(|\hat{p} - p| < 0.01) = 0.95$, we need at least sample size n ?
 (A) 385 (B) 6147 (C) 9604 (D) 19208
15. A random samples X_1, X_2, \dots, X_{20} follow a Normal distribution with mean $\mu = 200$ and variance $\sigma^2 = 100$, find the probability $P(826 \leq \sum_{i=1}^{20} (X_i - 200)^2 \leq 3141)$.
 (A) 0.84 (B) 0.90 (C) 0.94 (D) 0.99
16. Under Normal distribution, the $(1-\alpha)100\%$ confidence interval of population mean μ is $\bar{x} \pm 1.753 \cdot s / 4$, find the confidence level $(1-\alpha)100\%$.
 (A) 80% (B) 90% (C) 95% (D) 99%
17. A random samples X_1, X_2, \dots, X_9 follow a Normal distribution with mean $\mu = 0$ and variance σ^2 . Let a random variable $T = K(X_1 + X_2 - X_3) / \sqrt{\sum_{i=4}^9 X_i^2}$, find the constant K so that T has a t-distribution.
 (A) $\sqrt{0.5}$ (B) $\sqrt{1.5}$ (C) $\sqrt{2}$ (D) $\sqrt{6}$

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18. Under Normal distribution (σ^2 unknown), we get the 95% confidence interval for mean μ to be (20, 24) from sample size $n = 16$. Find the approximate value of sample deviation s .
(A) 3.75 (B) 3.77 (C) 4.08 (D) 4.56
19. A random samples X_1, X_2, \dots, X_n follow a Normal distribution with mean $\mu = 0$ and variance σ^2 . Find the unbiased estimator of σ^2 as follows.
(A) \bar{X}^2 (B) $\sum_{i=1}^n X_i^2 / n$ (C) $\sum_{i=1}^n (X_i - \bar{X})^2 / n$ (D) $\sum_{i=1}^n (X_i - \bar{X})^2 / \sigma^2$
20. For analysis of variance, samples of 7 observations, 6 observations, and 5 observations, were selected from three populations. And then we obtained the sample variance $s_1^2 = 26$, $s_2^2 = 24$ and $s_3^2 = 21$, find the within-treatments estimate σ^2 .
(A) 24.0 (B) 25.3 (C) 25.8 (D) 26.8

第二部分：計算題（共計 40 分）

1. A random variable X has the probability density function $f(x) = a + bx, 0 \leq x \leq 1$, with mean $\mu = 2/3$, and four independent observations are made on this variable X .
(A) Find a and b . (2%)
(B) Find $Var(X)$. (2%)
(C) What is $P(X > 0.3 | X \leq 0.8)$. (2%)
(D) What is the probability that all of the observations lie between the mean and median? (2%)
2. (A) State the central limit theorem and the type I error. (2%)
(B) A random samples X_1, X_2, \dots, X_{100} follow an Exponential distribution with mean $\mu = 10$. The hypothesis test: $H_0: \mu \leq 10$ v.s. $H_1: \mu > 10$, suppose the region of rejection H_0 to be $\{\bar{X} > 12\}$, by (A), find the significant level α . (5%)
(C) Continuing (B), what is the power at $\mu = 14$. (3%)
3. A dice is threw the number of 120 times, the number of point 1, 2, ..., 6 occur 18, 20, 24, 22, 18 and 18, respectively. Test the dice whether it is fair or not, base on significant level $\alpha = 0.05$. (8%)
4. A simple regression model: $y = \beta_0 + \beta_1 x + \varepsilon, \varepsilon \sim N(0, \sigma^2)$. By random samples $(x_1, y_1), (x_2, y_2), \dots, (x_{10}, y_{10})$, we obtain $\sum_{i=1}^{10} x_i = 140, \sum_{i=1}^{10} y_i = 1300, \sum_{i=1}^{10} x_i^2 = 2528, \sum_{i=1}^{10} y_i^2 = 184730$, and correlation coefficient $r = 0.95$.
(A) Find the regression equation $\hat{y} = b_0 + b_1 x$. (4%)
(B) Find the estimate of σ^2 . (2%)
(C) Test $H_0: \beta_1 = 0$ v.s. $H_1: \beta_1 \neq 0$, at significant level $\alpha = 0.05$, and comment the goodness of fit. (8%)

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標準正態分配百分點數與 Z 值對應值表



z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0	.0000	.0040	.0080	.0120	.0160	.0200	.0239	.0279	.0319	.0359
1	.0498	.0538	.0578	.0617	.0657	.0696	.0736	.0775	.0814	.0854
2	.0893	.0932	.0971	.1010	.1048	.1087	.1126	.1165	.1204	.1243
3	.1279	.1317	.1355	.1393	.1431	.1469	.1506	.1544	.1581	.1619
4	.1655	.1692	.1729	.1766	.1803	.1840	.1877	.1913	.1950	.1986
5	.1923	.1959	.1995	.2031	.2068	.2104	.2140	.2177	.2213	.2249
6	.2285	.2321	.2357	.2393	.2429	.2465	.2501	.2537	.2573	.2608
7	.2643	.2679	.2714	.2749	.2784	.2819	.2854	.2889	.2924	.2959
8	.2994	.3029	.3064	.3099	.3134	.3169	.3204	.3239	.3274	.3309
9	.3344	.3379	.3413	.3448	.3483	.3518	.3552	.3587	.3621	.3655
10	.3689	.3724	.3758	.3793	.3827	.3861	.3896	.3930	.3964	.3998
11	.4032	.4066	.4100	.4134	.4168	.4202	.4236	.4270	.4304	.4338
12	.4372	.4406	.4440	.4474	.4508	.4542	.4576	.4610	.4644	.4678
13	.4712	.4746	.4780	.4814	.4848	.4882	.4916	.4950	.4984	.5018
14	.5052	.5086	.5120	.5154	.5188	.5222	.5256	.5290	.5324	.5358
15	.5392	.5426	.5460	.5494	.5528	.5562	.5596	.5630	.5664	.5698
16	.5732	.5766	.5800	.5834	.5868	.5902	.5936	.5970	.6004	.6038
17	.6072	.6106	.6140	.6174	.6208	.6242	.6276	.6310	.6344	.6378
18	.6412	.6446	.6480	.6514	.6548	.6582	.6616	.6650	.6684	.6718
19	.6752	.6786	.6820	.6854	.6888	.6922	.6956	.6990	.7024	.7058
20	.7092	.7126	.7160	.7194	.7228	.7262	.7296	.7330	.7364	.7398
21	.7432	.7466	.7500	.7534	.7568	.7602	.7636	.7670	.7704	.7738
22	.7772	.7806	.7840	.7874	.7908	.7942	.7976	.8010	.8044	.8078
23	.8112	.8146	.8180	.8214	.8248	.8282	.8316	.8350	.8384	.8418
24	.8452	.8486	.8520	.8554	.8588	.8622	.8656	.8690	.8724	.8758
25	.8792	.8826	.8860	.8894	.8928	.8962	.8996	.9030	.9064	.9098
26	.9132	.9166	.9200	.9234	.9268	.9302	.9336	.9370	.9404	.9438
27	.9472	.9506	.9540	.9574	.9608	.9642	.9676	.9710	.9744	.9778
28	.9812	.9846	.9880	.9914	.9948	.9982	.9996	.9999	.9999	.9999

T 分配臨界值表



n	$t_{.100}$	$t_{.050}$	$t_{.025}$	$t_{.010}$	$t_{.005}$
1	3.078	6.314	12.706	31.821	63.657
2	1.886	2.920	4.303	6.965	9.925
3	1.638	2.353	3.182	5.841	8.451
4	1.533	2.132	2.776	5.247	7.604
5	1.476	2.015	2.571	4.761	6.851
6	1.440	1.943	2.447	4.414	6.207
7	1.415	1.893	2.365	4.180	5.808
8	1.397	1.860	2.306	3.989	5.558
9	1.383	1.833	2.262	3.851	5.401
10	1.372	1.812	2.228	3.747	5.279
11	1.363	1.796	2.201	3.678	5.196
12	1.356	1.782	2.179	3.621	5.133
13	1.350	1.771	2.160	3.576	5.083
14	1.345	1.761	2.145	3.541	5.042
15	1.341	1.753	2.133	3.512	5.007
16	1.337	1.746	2.120	3.487	4.977
17	1.333	1.740	2.110	3.467	4.950
18	1.330	1.734	2.101	3.452	4.928
19	1.328	1.729	2.093	3.440	4.911
20	1.325	1.725	2.086	3.430	4.897
21	1.323	1.721	2.080	3.421	4.887
22	1.321	1.717	2.074	3.413	4.879
23	1.319	1.714	2.069	3.406	4.872
24	1.318	1.711	2.064	3.400	4.866
25	1.316	1.708	2.060	3.395	4.861
26	1.315	1.706	2.056	3.391	4.857
27	1.314	1.703	2.052	3.387	4.853

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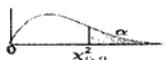
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第 5 頁共 5 頁

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卡方分配臨界值表



ν	$X^2_{.995}$	$X^2_{.990}$	$X^2_{.975}$	$X^2_{.950}$	$X^2_{.900}$	$X^2_{.850}$	$X^2_{.800}$	$X^2_{.750}$	$X^2_{.700}$	$X^2_{.650}$	$X^2_{.600}$	$X^2_{.550}$	$X^2_{.500}$	$X^2_{.450}$	$X^2_{.400}$	$X^2_{.350}$	$X^2_{.300}$	$X^2_{.250}$	$X^2_{.200}$	$X^2_{.150}$	$X^2_{.100}$	$X^2_{.050}$	$X^2_{.025}$	$X^2_{.010}$	$X^2_{.005}$
1	.000393	.0001571	.0009821	.0039321	.0157908	2.70554	3.84146	5.02389	6.63490	7.87944															
2	.0100251	.0301007	.0506356	.102587	.210720	4.60517	5.99147	7.37776	9.21034	10.5966															
3	.0717212	.114832	.215795	.351846	.584375	6.25139	7.81473	9.34840	11.3449	12.8381															
4	.206990	.297110	.484419	.710721	1.063623	7.77944	9.48773	11.1433	13.2767	14.8602															
5	.411740	.534300	.831213	1.145476	1.61031	9.23635	11.0705	12.8325	15.0863	16.7496															
6	.675727	.872083	1.237347	1.63539	2.20413	10.6446	12.5916	14.4594	16.8119	18.5476															
7	.989265	1.239043	1.68987	2.16735	2.83311	12.0170	14.0671	16.0128	18.4753	20.2777															
8	1.344419	1.646482	2.17973	2.73264	3.48954	13.3616	15.5073	17.5346	20.0902	21.9550															
9	1.734926	2.087912	2.70039	3.32511	4.16816	14.6837	16.9190	19.0228	21.6660	23.5893															
10	2.15585	2.55821	3.24697	3.94030	4.86518	15.9871	18.3070	20.4831	23.2093	25.1882															
11	2.60321	3.05347	3.81575	4.37481	5.57779	17.2750	19.6751	21.9200	24.7250	26.7569															
12	3.07382	3.57056	4.40379	5.22603	6.30380	18.5494	21.0261	23.3367	26.2170	28.2995															
13	3.56703	4.10691	5.00874	5.89186	7.04150	19.8119	22.3621	24.7356	27.6883	29.8194															
14	4.07468	4.66043	5.62872	6.57063	7.78953	21.0642	23.6848	26.1190	29.1413	31.3193															
15	4.60094	5.22935	6.26214	7.26094	8.54675	22.3072	24.9958	27.4884	30.5779	32.8013															
16	5.14224	5.81221	6.90766	7.96164	9.31223	23.5418	26.2962	28.8454	31.9999	34.2672															
17	5.69724	6.40776	7.56418	8.67176	10.0852	24.7690	27.5871	30.1910	33.4087	35.7185															
18	6.26481	7.01491	8.23075	9.39046	10.8649	25.9849	28.8693	31.5264	34.8053	37.1564															
19	6.84398	7.63273	8.90655	10.1170	11.6509	27.2036	30.1435	32.8523	36.1908	38.5822															
20	7.43386	8.26040	9.59083	10.8508	12.4426	28.4120	31.4104	34.1696	37.5662	39.9968															
21	8.03366	8.89720	10.28293	11.5913	13.2396	29.6151	32.6705	35.4789	38.9321	41.4010															
22	8.64272	9.54249	10.9823	12.3380	14.0415	30.8133	33.9244	36.7807	40.2894	42.7936															
23	9.26042	10.19567	11.6885	13.0905	14.8479	32.0069	35.1725	38.0757	41.6384	44.1813															
24	9.88623	10.8564	12.4011	13.8484	15.6587	33.1963	36.4151	39.3641	42.7978	45.5585															
25	10.5197	11.5240	13.1197	14.6114	16.4734	34.3816	37.6525	40.6465	44.3141	46.9278															
26	11.1603	12.1981	13.8439	15.3791	17.2919	35.5631	38.8852	41.9232	45.6417	48.2899															
27	11.8076	12.8786	14.5733	16.1513	18.1138	36.7412	40.1133	43.1944	46.9630	49.6449															
28	12.4613	13.5648	15.3079	16.9279	18.9392	37.9159	41.1372	44.4607	48.2782	50.9933															
29	13.1211	14.2565	16.0474	17.7083	19.7677	39.0875	42.3569	45.7222	49.5879	52.3356															
30	13.7867	14.9535	16.7908	18.4926	20.5992	40.2560	43.7729	46.9792	50.8922	53.6720															

F 表

$F_{0.05}(1, 8) = 5.32$ $F_{0.25}(1, 8) = 7.57$ $F_{0.05}(1, 9) = 5.12$ $F_{0.25}(1, 9) = 7.21$
 $F_{0.05}(2, 8) = 4.46$ $F_{0.25}(2, 8) = 6.06$