

國立聯合大學 106 學年度

寒假轉學生招生考試試題紙

科目： 統計學 第 1 頁共 3 頁

一、單選題(每題 4 分)

1. For a normal distribution, a positive value of z indicates that

(A) all the observations must have had positive values	(B) the area corresponding to the z is either positive or negative
(C) the sample mean is smaller than the population mean	(D) the sample mean is larger than the population mean

2. X is a normally distributed random variable with a mean of 5 and a variance of 4. The probability that X is greater than 10 is

(A) 0.0062	(B) 0.5062	(C) 0.4938	(D) 0.9938
------------	------------	------------	------------

3. Approximate the binomial probabilities $t = P(X = 18) = C_{18}^{50} 0.3^{18} 0.7^{32}$ by the use of normal approximation.

(A) $t < 0.05$	(B) $0.05 \leq t < 0.10$	(C) $0.10 \leq t < 0.15$	(D) $t \geq 0.15$
----------------	--------------------------	--------------------------	-------------------

4. The average price of cell phones manufactured by Ahmadi, Inc. is \$98 with a standard deviation of \$12. Furthermore, it is known that the prices of the cell phones manufactured by Ahmadi are normally distributed. What are the minimum and the maximum values of the middle 95% of cell phone prices?

(A) 117.74 and 78.26	(B) 74.48 and 121.52	(C) 74 and 122	(D) Inconclusive.
----------------------	----------------------	----------------	-------------------

5. The price of a bond is uniformly distributed between \$80 and \$85. What is the probability that the bond price will be between \$81 to \$90?

(A) 0	(B) 0.55	(C) 0.8	(D) 1
-------	----------	---------	-------

6. For the following hypothesis test, $H_0: \mu = 150$, $H_a: \mu < 150$, the test statistic

(A) must be negative	(B) must be positive
(C) can be either negative or positive	(D) must be a number between zero and 1

7. A sample of 1400 items had 280 defective items. For the following hypothesis test, $H_0: P = 0.20$, $H_a: P > 0.20$, the test statistic is

(A) 0.28	(B) 0.14	(C) 28%	(D) zero
----------	----------	---------	----------

8. In a two-tailed hypothesis test the test statistic is determined to be $Z = -2.1$. The p -value for this test is

(A) 0.0179	(B) 0.0358	(C) 0.4821	(D) 0.9642
------------	------------	------------	------------

9. A two-tailed test is performed at 95% confidence. The p -value is determined to be 0.09. The null hypothesis

(A) should not be rejected.	(B) must be rejected.
(C) could be rejected, depending on the sample size.	(D) is inconclusive.

10. For the hypothesis test $H_0: \mu \geq 54$ against $H_a: \mu < 54$, the sample information is given as

$n = 64$	$\bar{X} = 50$	$S = 16$
----------	----------------	----------

The test statistic is

(A) 2	(B) -3	(C) -2	(D) -1
-------	--------	--------	--------

國立聯合大學 106 學年度

寒假轉學生招生考試試題紙

科目： 統計學 第 2 頁共 3 頁

二、計算題

1. (15 分) A producer of various kinds of batteries has been producing "D" size batteries with a life expectancy of 87 hours. Due to an improved production process, management believes that there has been an increase in the life expectancy of their "D" size batteries. A sample of 36 batteries showed an average life of 88.5 hours. Assume from past information that it is known that the standard deviation of the population is 9 hours. Give the null and the alternative hypotheses. What is your conclusion about the hypotheses?

2. (15 分) Recently, a local newspaper reported that part time students are older than full time students. In order to test the validity of its statement, two independent samples of students were selected.

	Full Time	Part Time
Sample mean	26	24
Sample standard deviation	2	3
Sample size	42	31

Determine whether or not the average age of part time students is significantly more than full time students.

3. (15 分) You are given the following results from a sample of 6 observations. 4, 6, 3, 4, 3, 10. Determine the mean and the variance of this sample. Construct a 95% confidence interval for the population standard deviation.

4. (15 分) An egg packing company has stated that the standard deviation of the weights of their grade A large eggs is 0.07 ounces or less. The sample variance for 51 eggs was 0.0065 ounces. Can this sample result confirm the company's claim? Use the 0.05 significance level.

國立聯合大學 106 學年度

寒假轉學生招生考試試題紙

科目： 統計學

第 3 頁共 3 頁

(表一)若 $Z \sim N(0,1)$ ，則標準常態表的累積機率 $P(0 \leq Z \leq z)$
例如： $P(0 \leq Z \leq 1.96) = 0.4750$

Z	0	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.2549
0.7	0.2580	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2967	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990

(表二)若 $X \sim t(n)$ ，則單尾的 t 分配機率
例如： $P(t(4) \geq 2.776) = 0.025$

d.f.	0.01	0.0125	0.025	0.05
1	31.821	25.452	12.706	6.314
2	6.965	6.205	4.303	2.920
3	4.541	4.177	3.182	2.353
4	3.747	3.495	2.776	2.132
5	3.365	3.163	2.571	2.015
6	3.143	2.969	2.447	1.943
7	2.998	2.841	2.365	1.895
8	2.896	2.752	2.306	1.860
9	2.821	2.685	2.262	1.833
10	2.764	2.634	2.228	1.812
11	2.718	2.593	2.201	1.796
12	2.681	2.560	2.179	1.782
13	2.650	2.533	2.160	1.771
14	2.624	2.510	2.145	1.761
15	2.602	2.490	2.131	1.753
16	2.583	2.473	2.120	1.746
17	2.567	2.458	2.110	1.740
18	2.552	2.445	2.101	1.734
19	2.539	2.433	2.093	1.729
20	2.528	2.423	2.086	1.725
21	2.518	2.414	2.080	1.721
22	2.508	2.405	2.074	1.717
23	2.500	2.398	2.069	1.714
24	2.492	2.391	2.064	1.711
25	2.485	2.385	2.060	1.708
26	2.479	2.379	2.056	1.706
27	2.473	2.373	2.052	1.703
28	2.467	2.368	2.048	1.701
29	2.462	2.364	2.045	1.699
30	2.457	2.360	2.042	1.697

(表三)若 $X \sim \chi^2(n)$ ，則卡方分配的機率： $P(\chi^2(15) \geq 24.9958) = 0.05$ 。

d.f.	0.005	0.01	0.025	0.05	0.10	0.20
1	7.8794	6.6349	5.0239	3.8415	2.7055	1.6424
2	10.5966	9.2103	7.3778	5.9915	4.6052	3.2189
3	12.8382	11.3449	9.3484	7.8147	6.2514	4.6416
4	14.8603	13.2767	11.1433	9.4877	7.7794	5.9886
5	16.7496	15.0863	12.8325	11.0705	9.2364	7.2893
6	18.5476	16.8119	14.4494	12.5916	10.6446	8.5581
7	20.2777	18.4753	16.0128	14.0671	12.0170	9.8032
8	21.9550	20.0902	17.5345	15.5073	13.3616	11.0301
9	23.5894	21.6660	19.0228	16.9190	14.6837	12.2421
10	25.1882	23.2093	20.4832	18.3070	15.9872	13.4420
11	26.7568	24.7250	21.9200	19.6751	17.2750	14.6314
12	28.2995	26.2170	23.3367	21.0261	18.5493	15.8120
13	29.8195	27.6882	24.7356	22.3620	19.8119	16.9848
14	31.3193	29.1412	26.1189	23.6848	21.0641	18.1508
15	32.8013	30.5779	27.4884	24.9958	22.3071	19.3107
16	34.2672	31.9999	28.8454	26.2962	23.5418	20.4651
17	35.7185	33.4087	30.1910	27.5871	24.7690	21.6146
18	37.1565	34.8053	31.5264	28.8693	25.9894	22.7595
19	38.5823	36.1909	32.8523	30.1435	27.2036	23.9004
20	39.9968	37.5662	34.1696	31.4104	28.4120	25.0375
21	41.4011	38.9322	35.4789	32.6706	29.6151	26.1711
22	42.7957	40.2894	36.7807	33.9244	30.8133	27.3015
23	44.1813	41.6384	38.0756	35.1725	32.0069	28.4288
24	45.5585	42.9798	39.3641	36.4150	33.1962	29.5533
25	46.9279	44.3141	40.6465	37.6525	34.3816	30.6752
26	48.2899	45.6417	41.9232	38.8851	35.5632	31.7946
27	49.6449	46.9629	43.1945	40.1133	36.7412	32.9117
28	50.9934	48.2782	44.4608	41.3371	37.9159	34.0266

(表四)單尾為 0.05 之 $F(m,n)$ 分配，即 $P(F(m,n) \geq f) = 0.05$ 。
例如： $P(F(6,5) \geq 4.9503) = 0.05$ 。

	1	2	3	4	5	6	7	8	9	10	11	12
1	161.447	199.500	215.707	224.5832	230.161	233.986	236.768	238.882	240.543	241.881	242.983	243.9060
2	18.5128	19.0000	19.1643	19.2468	19.2964	19.3295	19.3532	19.3710	19.3848	19.3959	19.4050	19.4125
3	10.1280	9.5521	9.2766	9.1172	9.0135	8.9406	8.8867	8.8452	8.8123	8.7855	8.7633	8.7446
4	7.7086	6.9443	6.5914	6.3882	6.2561	6.1631	6.0942	6.0410	5.9988	5.9644	5.9358	5.9117
5	6.6079	5.7861	5.4095	5.1922	5.0503	4.9503	4.8759	4.8183	4.7725	4.7351	4.7040	4.6777
6	5.9874	5.1433	4.7571	4.5337	4.3874	4.2839	4.2067	4.1468	4.0990	4.0600	4.0274	3.9999
7	5.5914	4.7374	4.3468	4.1203	3.9715	3.8660	3.7870	3.7257	3.6767	3.6365	3.6030	3.5747
8	5.3177	4.4590	4.0662	3.8379	3.6875	3.5806	3.5005	3.4381	3.3881	3.3472	3.3130	3.2839
9	5.1174	4.2565	3.8625	3.6331	3.4817	3.3738	3.2927	3.2296	3.1789	3.1373	3.1025	3.0729
10	4.9646	4.1028	3.7083	3.4780	3.3258	3.2172	3.1355	3.0717	3.0204	2.9782	2.9430	2.9130
11	4.8443	3.9823	3.5874	3.3567	3.2039	3.0946	3.0123	2.9480	2.8962	2.8536	2.8179	2.7876
12	4.7472	3.8853	3.4903	3.2592	3.1059	2.9961	2.9134	2.8486	2.7964	2.7534	2.7173	2.6866
13	4.6672	3.8056	3.4105	3.1791	3.0254	2.9153	2.8321	2.7669	2.7144	2.6710	2.6347	2.6037
14	4.6001	3.7389	3.3439	3.1122	2.9582	2.8477	2.7642	2.6987	2.6458	2.6022	2.5655	2.5342
15	4.5431	3.6823	3.2874	3.0556	2.9013	2.7905	2.7066	2.6408	2.5876	2.5437	2.5068	2.4753
16	4.4940	3.6337	3.2389	3.0069	2.8524	2.7413	2.6572	2.5911	2.5377	2.4935	2.4564	2.4247
17	4.4513	3.5915	3.1968	2.9647	2.8100	2.6987	2.6143	2.5480	2.4943	2.4499	2.4126	2.3807
18	4.4139	3.5546	3.1599	2.9277	2.7729	2.6613	2.5767	2.5102	2.4563	2.4117	2.3742	2.3421
19	4.3807	3.5219	3.1274	2.8951	2.7401	2.6283	2.5435	2.4768	2.4227	2.3779	2.3402	2.3080
20	4.3512	3.4928	3.0984	2.8661	2.7109	2.5990	2.5140	2.4471	2.3928	2.3479	2.3100	2.2776
21	4.3248	3.4668	3.0725	2.8401	2.6848	2.5727	2.4876	2.4205	2.3660	2.3210	2.2829	2.2504
22	4.3009	3.4434	3.0491	2.8167	2.6613	2.5491	2.4638	2.3965	2.3419	2.2967	2.2585	2.2258
23	4.2793	3.4221	3.0280	2.7955	2.6400	2.5277	2.4422	2.3748	2.3201	2.2747	2.2364	2.2036
24	4.2597	3.4028	3.0088	2.7763	2.6207	2.5082	2.4226	2.3551	2.3002	2.2547	2.2163	2.1834
25	4.2417	3.3852	2.9912	2.7587	2.6030	2.4904	2.4047	2.3371	2.2821	2.2365	2.1979	2.1649
26	4.2252	3.3690	2.9752	2								