※ 注意：請於試卷內之「非選擇題作答區」標明題號依序作答。

填空題，每題五分，請清楚標明計算過程，無計算過程不給分

1. A cell phone manufacturer purchases phone components from two suppliers, A and B (60% from supplier A and 40% from supplier B). Two suppliers produce the phone components with different production faulty rates: 5% for supplier A and 3% for supplier B. If one component is selected randomly, the probability that the testing shows the component is faulty is X and the probability that the testing show the component is faultless is Y. Then X-Y = _____

2. Consider one random variable X with probability density function $f(x) = \frac{m}{2}(1+x)^{-3}$ for $0 < x < \infty$ and $f(x) = 0$ otherwise. Let $E[X]$ be the expectation of random variable X, then $(E[X])^m$ = _____

3. There are two independent observations X and Y drawn from two distributions in which $P(X = 0) = 0.4$, $P(X = 1) = 0.6$, $P(Y = 0) = 0.6$, and $P(Y = 1) = 0.4$. The sampling distribution of the sample mean of these two observations is _____

4. One student draws a sample from a uniform distribution $X \sim U(20, 80)$, and the sample size is 66. The probability that at least 45 of these values are between 40 and 120 is _____

5. One person selects a random sample from a normal distribution and the sample size is 25. If the 95% of confidence level of μ is [32, 56]. The standard deviation of the sample is _____
(Note that $t_{0.025,24} = 2.064, t_{0.025,25} = 2.060$)

6. A market survey shows that the market share of Brand A is 35% (versus the market share 42% of Brand B). A professor hopes to conduct a new study and he needs to find the fans of Brand A. Potential candidates for the test are randomly selected. What is the probability that the first fan of Brand A is found after the professor has interviewed three candidates?

7. One brand manager claims that more than 30% of the customers like their products. To prove his claim is correct, 100 people are randomly selected. At 5% significance level, how many customers among these 100 people should like the products so that one can say this brand manager's claim is correct?

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8. Consider A, B and C are mutually independent events. If P(A)=0.7, P(B)=0.65 and P(C)=0.8. Find $P(A \cup (B \cap C))$ =_____

9. Suppose the mean time between arrivals of buses is 15 minutes and it follows Exponential distribution. When you arrive at the bus stop, you know the previous bus left 5 minutes ago, then the expectation of waiting for the next bus is _____

10. One person randomly picks two balls from a box with 3 white balls, 2 read balls and 3 blue balls. Let X be the number of red balls and Y be the number of blue balls. Find the probability $P(1 \leq X + Y \leq 2)$ =_____

11. Three different drugs were designed to lower heart rates in patients. Subjects were randomly assigned to three groups. The results are shown below.

Group 1	Group 2	Group 3
82	101	98
86	99	89
87	95	92
83	89	97
84	94	96

The researchers want to know whether there was a difference in the heart rates of patients taking different drugs. The Kruskal-Wallis H test statistics = _____.

12. The weekly website hits (x) and restaurant weekly revenue (y, in thousand dollars) are recorded for 49 restaurants. In the sample data, x has a sample mean of 1182.4 and a sample standard deviation of 226.0, while y has a sample mean of 49.6 and a sample standard deviation of 7.1. The sample correlation between x and y is 0.673. Use the information provided, calculate the simple linear regression equation: _____.

13. A marketing manager has been asked to generate a demand forecast for a product for year 2017 using an exponential smoothing method. The forecast demand in 2016 was 910. The actual demand in 2016 was 850. Using this data and a smoothing constant of 0.3, the demand forecast for year 2017 = _____.

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14. In a study on teenage pregnancies, the researchers fitted the model:

$Y= \alpha +\beta 1Age+\beta 2Group+\beta 3Age*Group+\varepsilon$, where

y=weight of baby at birth (in pounds) ;

Age=age of the mother;

Group=0 for mother who received prenatal care, =1 for those who didn't.

Parts of the computer output appear below.

	Coefficient	Std. error	t	p
intercept	1.312	0.085	15.464	.000
Age	1.093	0.146	7.483	.000
Group	-1.253	0.212	-5.901	.000
Age*Group	-0.352	0.207	-1.706	.092

a) What are the estimated regression lines for the two groups?

b) In this case, is it statistically necessary to fit two regression lines with different slopes? Why or why not?

15. An analyst fitted a regression equation $Y= \alpha +\beta 1x1+\beta 2x2+\varepsilon$, and obtained the following results:

	Coefficient	Std. error	t
intercept	240.326	48.589	4.946
X1	1.392	0.197	7.066
X2	-3.648	9.685	-0.377

ANOVA	df	SS
Regression	2	3940.286
Residual	97	4268.185
Total	99	8208.471

The analyst then added another independent variable, X3, to the regression model. As a result, SSR increases to 3972.297. The slope coefficient of X3 is significantly different from zero at the 5% significance level. Should the third independent variable be added to the analysis? Why or why not?

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Question 16& 17. The table below shows the response from a sample of 650 people in a Social Survey to the question, "Do you sometimes drink more than you think you should?"

	Respond "Yes"	Respond "No"
Male	150	170
Female	90	240

16. Suppose you want to test whether there is a difference between sexes in the proportion who report that they drank more than they should. What is the test statistic? _____. (Please specify the name, the value, and the degree of freedom of the test statistic.)

17. The odds ratio for women thinking they drank more than they should compared to men= _____.

18. A student analyzed data for a one-way analysis of variance situation for which there were 4 levels of the factor, and 20 people measured at each level. Unfortunately, after running the analysis, the student lost the computer output. She said "All I remember is that one of the mean squares was 100 and the other one was 400, but I can't remember which was which. Oh, and I remember that the p-value for the test was about .01." Based on this information, please calculate the following values: a) Sum of Squares between groups, b) Sum of Squares within groups, c) Mean Square between groups, d)Mean Square within groups, e)F test statistics.

19. A randomized block design is conducted to compare the output of three weaving looms (treatments) for a sample of 10 operators (blocks), where each operator's output is measured on each loom. The Mean Square Error from the ANOVA is equal to 500. Bonferroni's B (the minimum significant difference for concluding that two looms' population means differ if their sample means differ by at least B) = _____.

20. Draw a scatter plot of Y versus X showing points for a simple linear regression analysis, illustrating a case (point A) that has a small studentized residual but high leverage, and a case (point B) that has a large studentized residual but small leverage. Make sure you label which point is which.

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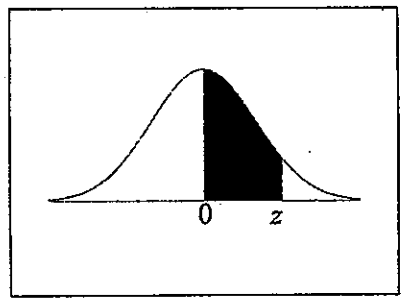
Standard Normal Distribution Table



z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517	.2549
0.7	.2580	.2611	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.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
3.1	.4990	.4991	.4991	.4991	.4992	.4992	.4992	.4992	.4993	.4993
3.2	.4993	.4993	.4994	.4994	.4994	.4994	.4994	.4995	.4995	.4995
3.3	.4995	.4995	.4995	.4996	.4996	.4996	.4996	.4996	.4996	.4997
3.4	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4998
3.5	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998

Gilles Cazelais. Typeset with LaTeX on April 20, 2006.

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Critical Values for Bonferroni's Method of Multipe Comparisons

	Number of Simultaneous Comparisons									
Df	1	2	3	4	5	6	7	8	9	10
1	12.71	25.45	38.19	50.92	63.66	76.39	89.12	101.9	114.6	127.3
2	4.303	6.205	7.649	8.860	9.925	10.89	11.77	12.59	13.36	14.09
3	3.182	4.177	4.857	5.392	5.841	6.232	6.580	6.895	7.185	7.453
4	2.776	3.495	3.961	4.315	4.604	4.851	5.068	5.261	5.437	5.598
5	2.571	3.163	3.534	3.810	4.032	4.219	4.382	4.526	4.655	4.773
6	2.447	2.969	3.287	3.521	3.707	3.863	3.997	4.115	4.221	4.317
7	2.365	2.841	3.128	3.335	3.499	3.636	3.753	3.855	3.947	4.029
8	2.306	2.752	3.016	3.206	3.355	3.479	3.584	3.677	3.759	3.833
9	2.262	2.685	2.933	3.111	3.250	3.364	3.462	3.547	3.622	3.690
10	2.228	2.634	2.870	3.038	3.169	3.277	3.368	3.448	3.518	3.581
11	2.201	2.593	2.820	2.981	3.106	3.208	3.295	3.370	3.437	3.497
12	2.179	2.560	2.779	2.934	3.055	3.153	3.236	3.308	3.371	3.428
13	2.160	2.533	2.746	2.896	3.012	3.107	3.187	3.256	3.318	3.372
14	2.145	2.510	2.718	2.864	2.977	3.069	3.146	3.214	3.273	3.326
15	2.131	2.490	2.694	2.837	2.947	3.036	3.112	3.177	3.235	3.286
16	2.120	2.473	2.673	2.813	2.921	3.008	3.082	3.146	3.202	3.252
17	2.110	2.458	2.655	2.793	2.898	2.984	3.056	3.119	3.173	3.222
18	2.101	2.445	2.639	2.775	2.878	2.963	3.034	3.095	3.149	3.197
19	2.093	2.433	2.625	2.759	2.861	2.944	3.014	3.074	3.127	3.174
20	2.086	2.423	2.613	2.744	2.845	2.927	2.996	3.055	3.107	3.153
21	2.080	2.414	2.601	2.732	2.831	2.912	2.980	3.038	3.090	3.135
22	2.074	2.405	2.591	2.720	2.819	2.899	2.965	3.023	3.074	3.119
23	2.069	2.398	2.582	2.710	2.807	2.886	2.952	3.009	3.059	3.104
24	2.064	2.391	2.574	2.700	2.797	2.875	2.941	2.997	3.046	3.091
25	2.060	2.385	2.566	2.692	2.787	2.865	2.930	2.986	3.035	3.078
26	2.056	2.379	2.559	2.684	2.779	2.856	2.920	2.975	3.024	3.067
27	2.052	2.373	2.552	2.676	2.771	2.847	2.911	2.966	3.014	3.057
28	2.048	2.368	2.546	2.669	2.763	2.839	2.902	2.957	3.004	3.047
29	2.045	2.364	2.541	2.663	2.756	2.832	2.894	2.949	2.996	3.038
30	2.042	2.360	2.536	2.657	2.750	2.825	2.887	2.941	2.988	3.030
40	2.021	2.329	2.499	2.616	2.704	2.776	2.836	2.887	2.931	2.971
50	2.009	2.311	2.477	2.591	2.678	2.747	2.805	2.855	2.898	2.937
60	2.000	2.299	2.463	2.575	2.660	2.729	2.785	2.834	2.877	2.915
70	1.994	2.291	2.453	2.564	2.648	2.715	2.771	2.820	2.862	2.899
80	1.990	2.284	2.445	2.555	2.639	2.705	2.761	2.809	2.850	2.887
90	1.987	2.280	2.440	2.549	2.632	2.698	2.753	2.800	2.841	2.878
100	1.984	2.276	2.435	2.544	2.626	2.692	2.747	2.793	2.834	2.871
110	1.982	2.272	2.431	2.539	2.621	2.687	2.741	2.788	2.829	2.865
120	1.980	2.270	2.428	2.536	2.617	2.683	2.737	2.783	2.824	2.860
130	1.978	2.268	2.425	2.533	2.614	2.679	2.733	2.780	2.820	2.856
140	1.977	2.266	2.423	2.530	2.611	2.676	2.730	2.776	2.817	2.852
150	1.976	2.264	2.421	2.528	2.609	2.674	2.728	2.774	2.814	2.849
160	1.975	2.263	2.419	2.526	2.607	2.671	2.725	2.771	2.811	2.846
170	1.974	2.261	2.418	2.525	2.605	2.669	2.723	2.769	2.809	2.844
180	1.973	2.260	2.417	2.523	2.603	2.668	2.721	2.767	2.807	2.842
190	1.973	2.259	2.415	2.522	2.602	2.666	2.720	2.765	2.805	2.840
200	1.972	2.258	2.414	2.520	2.601	2.665	2.718	2.764	2.803	2.839
999	1.962	2.245	2.398	2.502	2.581	2.644	2.696	2.740	2.779	2.813

試題隨卷繳回