

元智大學 102 學年度研究所 碩士班 招生試題卷

系(所)別: 管理學院商學碩士班 組別: 財務金融碩士學位 科目: 統計學 用紙第 / 頁共 5 頁

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**Detail procedures and calculations must be provided to support final answers otherwise no points will be granted.**

1. (5 points) Michael wants to take French or Spanish, or both. But classes are closed, and he must apply and get accepted to be allowed to enroll in a language class. He has a 30% chance of being admitted to French, a 45% chance of being admitted to Spanish, and a 15% chance of being admitted to both French and Spanish. If he applies to both French and Spanish, the probability that he will be enrolled in French or Spanish is?
2. (5 points) If  $n = 20$  and  $p = 0.60$ , what would be the standard deviation of the binomial distribution?
3. (5 points) A six-sided die is made that has four green sides and two red sides, all equally likely to land face up when the die is tossed. The die is tossed three times, what is the probability to get at least one red side?
4. (5 points) Suppose that it takes an average of 5.5 minutes for a college student to find a parking spot in the library parking lot, and such length of time follows a normal distribution with standard deviation of 1 minute. Please find the probability that a randomly selected college student will take between 4.5 and 7 minutes to find a parking spot in the library parking lot.
5. (10 points) Thirty percent of the students in a high school face a disciplinary action of some kind before they graduate. Of those students, 40% go on to college. For who do not face a disciplinary action, 60% go on to college.
  - (A) What percent of the students from the high school go on to college?
  - (B) Given that a randomly selected student goes on to college, what is the probability that he or she faced a disciplinary action?
6. (15 points) Suppose we know that, 10 years ago, the weights of catfish are normally distributed, with mean of 5.4 pounds and standard deviation of 1.2 pound. A researcher likes to know that if the sizes of catfish have increased for the past 10 year and collects a sample of 36 fish which yields a mean of 5.8 pounds.
  - (A) Please state the null and alternative hypotheses. (5 points)
  - (B) Please find the z-score. (5 points)
  - (C) Please conclude the research with 1% significance level. (5 points)

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7. (10 points) Draw one card at random from a standard deck of cards. The sample space  $S$  is the collection of the 52 cards. There are 4 suits in a deck of cards: spades, hearts, diamonds, and clubs (spades and clubs are black, and hearts and diamonds are red). Each suit have 13 cards: from 1 to 13, where 11, 12, and 13 are known as Jack, Queen, and King, respectively. Let  
 $A = \{x \text{ is smaller or equal to } 7 \text{ and } x \text{ is club}\}$ ,  
 $B = \{x \text{ is a } 6, 7, 8, \text{ or } 9, \text{ and } x \text{ is black}\}$ ,  
 $C = \{x \text{ is either } 7 \text{ of hearts or } 8 \text{ of spades}\}$ . Please find  
 (A)  $P(A \text{ and } B)$  and  $P(B \text{ or } C)$ , (5 points)  
 (B)  $P(B|A)$  and  $P(A|C)$ . (5 points)
8. (5 points) You want to rent an unfurnished one-bedroom apartment for next semester. The average monthly rent for a sample of 20 apartments advertised in the local newspaper is \$7,200. Assume the standard deviation of monthly rent in the area is \$1,100, please find the 90% confidence interval for the mean monthly rent in the community.
9. (10 points) A teacher likes to know whether heights of male high school students are taller than female high school students. He takes a sample of seven male students and records their heights as below, and he also knows that the average height of all female high school students is 161. Conduct test of significance with proper statements of hypotheses at both 90% and 95% confidence level.  
 170 185 155 165 161 172 168
10. (10 points) You are given the following data based on 10 pairs of observations on  $y$  and  $x$ .  $\sum y_i = 1,110$ ;  $\sum x_i = 1,680$ ;  $\sum x_i y_i = 204,200$ ;  $\sum y_i^2 = 133,300$ ;  $\sum x_i^2 = 315,400$ . Suppose you run the regression of  $y = \beta_0 + \beta_1 x + e$ . Please obtain  $\hat{\beta}_0$  and  $\hat{\beta}_1$  and their standard errors. Is  $\hat{\beta}_1$  statistically significant at 95%? Please also find the  $R^2$ .
11. (5 points) The first-round baseball postseason series continues until one of two teams wins three games. Thus, the series can go either 3, 4, or 5 games. What is the probability the series goes for 4 games?
12. (5 points) A labor economist likes to know how the education level affect wage rate for people. He has following 6 people's data as below. Find the correlation between the two variables. How does the correlation indicate level of relationship?

Wage per hour (\$)	140	250	108	165	225	210
Years of education	14	16	12	12	18	16

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13. (10 points) The average TOFEL score of freshman of Yuan Ze University in 2012 was 960 with standard deviation equal to 40. Assume normal distribution
- (A) What is the probability that a randomly chosen freshman has TOFEL score above or equal 980? (5 points)
- (B) What is the probability that the average score of a random selected sample of 9 freshmen is 970 or higher? (5 points)

<<End of exam>>

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Standard Normal Distribution (Z Table)

Z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990

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t Table (two-tailed)

df	0.5	0.2	0.1	0.05	0.02	0.01	0.002
1	1.000	3.078	6.314	12.706	31.821	63.657	318.309
2	0.816	1.886	2.920	4.303	6.965	9.925	22.327
3	0.765	1.638	2.353	3.182	4.541	5.841	10.215
4	0.741	1.533	2.132	2.776	3.747	4.604	7.173
5	0.727	1.476	2.015	2.571	3.365	4.032	5.893
6	0.718	1.440	1.943	2.447	3.143	3.707	5.208
7	0.711	1.415	1.895	2.365	2.998	3.499	4.785
8	0.706	1.397	1.860	2.306	2.896	3.355	4.501
9	0.703	1.383	1.833	2.262	2.821	3.250	4.297
10	0.700	1.372	1.812	2.228	2.764	3.169	4.144
11	0.697	1.363	1.796	2.201	2.718	3.106	4.025
12	0.695	1.356	1.782	2.179	2.681	3.055	3.930
13	0.694	1.350	1.771	2.160	2.650	3.012	3.852
14	0.692	1.345	1.761	2.145	2.624	2.977	3.787
15	0.691	1.341	1.753	2.131	2.602	2.947	3.733
16	0.690	1.337	1.746	2.120	2.583	2.921	3.686
17	0.689	1.333	1.740	2.110	2.567	2.898	3.646
18	0.688	1.330	1.734	2.101	2.552	2.878	3.610
19	0.688	1.328	1.729	2.093	2.539	2.861	3.579
20	0.687	1.325	1.725	2.086	2.528	2.845	3.552
22	0.686	1.321	1.717	2.074	2.508	2.819	3.505
24	0.685	1.318	1.711	2.064	2.492	2.797	3.467
26	0.684	1.315	1.706	2.056	2.479	2.779	3.435
28	0.683	1.313	1.701	2.048	2.467	2.763	3.408
30	0.683	1.310	1.697	2.042	2.457	2.750	3.385
40	0.681	1.303	1.684	2.021	2.423	2.704	3.307
50	0.679	1.299	1.676	2.009	2.403	2.678	3.261
60	0.679	1.296	1.671	2.000	2.390	2.660	3.232
80	0.678	1.292	1.664	1.990	2.374	2.639	3.195
100	0.677	1.290	1.660	1.984	2.364	2.626	3.174
120	0.677	1.289	1.658	1.980	2.358	2.617	3.160
500	0.675	1.283	1.648	1.965	2.334	2.586	3.107
∞	0.674	1.282	1.645	1.960	2.326	2.576	3.090