國立臺北大學105學年度日間學士班暨進修學士班轉學生招生考試試題

系　　別：統計學系日間學士班2、3年級暨
　　數位行銷進修學士學位學程2年級　　考試時間：80分鐘

科　　目：統計學　　第1頁 共5頁

☑可 ☐不可 使用計算機

本試題為單選題，每題5分，共計100分。請將答案及題號標示清楚並填入答案卷。

1. Let X be a continuous random variable and $F(x) = P(X \le x)$, where x is a real number. Which one of the following statements is true?
(A) $F(x)$ is non-decreasing in x
(B) $\sum_x F(x) = 1$
(C) $x \ge 0$
(D) $\sum_x x = 1$
(E) $F(0) = 0.5$

2. 100 students participated in a statistics test. Test scores are shown a normal distribution with mean 50 and standard deviation 10. Approximately how many students whose scores are between 40 and 60?
(A) 34
(B) 50
(C) 68
(D) 75
(E) 95

3. In an instant lottery, your chances of winning are 0.2. If you play the lottery five times and outcomes are independent, the probability that you win at least once is
(A) 0.0819
(B) 0.6723
(C) 0.4096
(D) 0.7373
(E) 0.8125

4. The time to complete a standardized exam.is approximately normal with a mean of 70 minutes and a standard deviation of 10 minutes. Using the 68-95-99.7 rule, what percent of students will complete the exam. in under an hour?
(A) 68%
(B) 32%
(C) 16%
(D) 5%
(E) 1%

5. 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
(E) 25

6. A standard normal distribution is a normal distribution
(A) With a mean of 1 and a standard deviation of 0
(B) With a mean of 0 and a standard deviation of 1
(C) With any mean and a standard deviation of 1
(D) With any mean and any standard deviation
(E) With a mean of 0 and a standard deviation of 0

7. The probability distribution of random variable, X, is defined as follows:

X	0	1	2	3	4
Probability	?	0.3	0.1	0.3	0.3

What is the missing value?

(A) 0
(B) 0.1
(C) 0.2
(D) 0.3
(E) 0.4

8. A box contains 10 bulbs, 2 of which are defective. If 3 bulbs are picked randomly, what is the probability that at least one defective is picked?

(A) $\frac{1}{6}$
(B) $\frac{8}{15}$
(C) $\frac{2}{3}$
(D) $\frac{7}{15}$
(E) $\frac{5}{6}$

9. Independently toss a fair dice 4 times. Suppose that X_i is the outcome of the i^{th} toss, and $\bar{X} = \frac{X_1 + X_2 + X_3 + X_4}{4}$. Then $Var(\bar{X})$ is:

(A) $\frac{35}{12}$
(B) $\frac{35}{24}$
(C) $\frac{35}{36}$
(D) $\frac{35}{48}$
(E) $\frac{35}{60}$

10. As the sample size increases, the

(A) Standard deviation of the population decreases
(B) Population mean increases
(C) Sample mean increases
(D) Standard error of the sample mean increases
(E) Standard error of the sample mean decreases

11. A random sample of size 25 is to be taken from a population that is normally distributed with mean 60 and standard deviation 10. The average $\bar{x}$ of the observations in our sample is to be computed. The sampling distribution of $\bar{x}$ is
(A) Normal with mean 60 and standard deviation 10
(B) Normal with mean 60 and standard deviation 2
(C) Normal with mean 60 and standard deviation 0.4
(D) Normal with mean 60 and standard deviation 25
(E) Normal with mean 60 and standard deviation 2.5

12. The SAT scores of entering freshmen at a certain university have mean 1215 and standard deviation 110. A random sample of 100 freshmen is taken and $\bar{x}$, the sample mean of their SAT scores, is computed. The probability that $\bar{x}$ less than 1190 is
(A) 0.0116
(B) 0.1335
(C) 0.4090
(D) 0.4562
(E) 0.1628

13. As the sample size becomes larger, the sampling distribution of the sample mean approaches a
(A) Binomial distribution
(B) Poisson distribution
(C) Normal distribution
(D) Chi-square distribution
(E) t distribution

14. Which of the following is true?
(A) If we draw a simple random sample of any size from any population the sampling distribution of the sample mean will be exactly Normal.
(B) If we draw a simple random sample of any size from any population the sampling distribution of the sample mean will be close to Normal.
(C) Central limit theorem only applies when sampling from Normal populations.
(D) None of the above.

15. A professor of statistics refutes the claim that the average student spends 3 hours studying for the midterm exam. The professor thinks the students spend more time than that. Which hypotheses are used to test the claim?
(A) H_0: $\mu \leq 3$ vs. H_a: $\mu > 3$
(B) H_0: $\mu = 3$ vs. H_a: $\mu \neq 3$
(C) H_0: $\mu \neq 3$ vs. H_a: $\mu = 3$
(D) H_0: $\mu = 3$ vs. H_a: $\mu < 3$
(E) H_0: $\mu \geq 3$ vs. H_a: $\mu = 3$

16. We test the null hypothesis H_0: $\mu = 10$ and the alternative H_a: $\mu < 10$, for a normal population with $\sigma = 4$. A random sample of 16 observations is drawn from the population and we find the sample mean of these observations is 12. The p-value is closest to
(A) 0.0228
(B) 0.0456
(C) 0.1016
(D) 0.9772
(E) 0.9999

17. The nicotine content in cigarettes of a certain brand is normally distributed, with mean (in milligrams) and standard deviation $\sigma = 0.1$. The brand advertises that the mean nicotine content of its cigarettes is 1.5, but measurements on a random sample of 100 cigarettes of this brand give a mean of $\bar{x} = 1.53$. Is this evidence that the mean nicotine content is actually higher than advertised? To answer this, test the hypotheses
H_0: $\mu = 1.5$, H_a: $\mu > 1.5$ at the 5% significance level. You conclude
(A) That H_0 should be rejected.
(B) That H_0 should not be rejected.
(C) That H_a should be rejected.
(D) There is a 5% chance that the null hypothesis is true.
(E) There is a 5% chance that the alternative hypothesis is true.

18. A certain population follows a normal distribution with mean μ and standard deviation $\sigma = 2.5$. You collect data and test the hypotheses
H_0: μ = 1, H_a: μ≠ 1.
You obtain a *p*-value of 0.022. Which of the following is true?
(A) A 90% confidence interval for μ will include the value 1.
(B) A 95% confidence interval for μ will include the value 1.
(C) A 95% confidence interval for μ will include the value 0.
(D) A 99% confidence interval for μ will include the value 1.
(E) A 99% confidence interval for μ will include the value 0.

19. Suppose that the significant level of a statistical hypothesis test is α. The null hypothesis will be rejected when:
(A) *p*-value $\leq \alpha$
(B) *p*-value $> \alpha$
(C) *p*-value $\leq \alpha/2$
(D) *p*-value $> \alpha/2$
(E) *p*-value $= \frac{\alpha}{2}$

20. The average monthly rent for one-bedroom apartments in Chattanooga 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: μ≥700 v.s. H_a: μ < 700
(B) H_0: μ = 700 v.s. H_a: μ≠700
(C) H_0: μ> 700 v.s. H_a: μ≤700
(D) H_0: μ < 700 v.s. H_a: μ≥700
(E) H_0: μ < 700 v.s. H_a: μ>700

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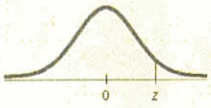
Table Z (cont.)

Areas under the standard Normal curve



	Second decimal place in z									
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
3.1	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3	0.9995	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
3.4	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998
3.5	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998
3.6	0.9998	0.9998	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
3.7	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
3.8	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
3.9	1.0000†									

† For $z \geq 3.90$, the areas are 1.0000 to four decimal places.

試題隨卷繳交