

考 試 科 目	統 計 學	系 所 別	財 務 管 理 學 系	考 試 時 間	2 月 6 日 (星期二) 第四節
1. (5 %) Which of the following visualizations is most appropriate and informative for exploring the distribution of the EPS (earnings per share) of a group of 500 companies? A. Bar chart. B. Scatter plot. C. Histogram. D. Box-whisker plot. 2. (5 %) Given the annual rate of return of a stock in 5 consecutive years, which of the following is more appropriate measure for average rate of return? A. Mean B. Median C. Mode D. Geometric mean 3. (5 %) Which of the following statements is incorrect? A. A political poll is a random experiment. B. A census is not a random experiment. C. Given events A, B and their complements, $\sim A$, $\sim B$. Then $P(\sim A \sim B) = 1 - P(A B)$. D. Suppose A and B are not zero-probability events. If they are independent, they are not disjoint. 4. (5 %) Which of the following statements is least correct? A. If X follows a bi-modal distribution with finite mean and variance, Chebyshev's Theorem can be applied. B. If X follows a bi-modal distribution with finite mean and variance, Central Limit Theorem can be applied. C. If a sample of $n=30$ subjects is randomly drawn with replacement from a population of $N=100$, the continuity correction is necessary when applying Normal approximation for probability of an event associating sample proportion. D. If a sample of $n=30$ is randomly drawn with replacement from a population of $N=100$, the finite population correction factor is necessary. 5. (5 %) If based on a sample dataset, a statistical test rejects some H_0 at significance level 5%, which of the following statements associated with the data and the test is incorrect? A. Type I error rate $\leq 5\%$. B. Power = 95%. C. P-value $\leq 5\%$. D. H_0 will be rejected at significance level 10%.					

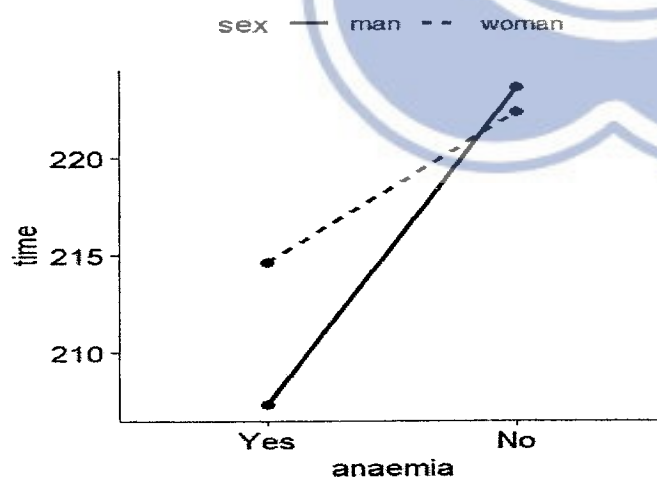
選擇題請在答案卡上作答，否則不予計分。

考 試 科 目	統 計 學	系 所 別	財 務 管 理 學 系	考 試 時 間	2 月 6 日 (星 期 二) 第 四 節
---------	-------	-------	-------------	---------	-------------------------

6. (5 %) Suppose one plan to conduct a survey to estimate the percentage of overweight adults. What is the minimal required sample size such that at 90% confidence level, the margin of sampling error is 3%?
- A. 752
B. 892
C. 1028
D. 1068
7. (5 %) Suppose in a random sample of 100 adults, 20 are overweight, find the 90% confidence interval of the population overweight proportion.
- A. [0.13, 0.27]
B. [0.11, 0.29]
C. [0.16, 0.24]
D. [0.19, 0.21]
8. (5 %) Consider the EPS of a sample of 4 companies (in USD). It's known that $\bar{x} = 3.3$, $s = 1.6$, the standard error of the mean is
- A. 0.5
B. 0.8
C. 1.6
D. 2.1
9. (5 %) (Cont. 8) Suppose EPS has a normal population distribution, find 90% confidence interval of population mean EPS.
- A. [-1.1, 7.7]
B. [1.1, 5.5]
C. [-0.5, 7.0]
D. [1.4, 5.2]
10. (5 %) Which of the followings does not imply a normal population distribution?
- A. The empirical rule holds.
B. The QQ plot is close to a straight line.
C. The histogram is unimodal and symmetric.
D. No data point appears outside the whisker in the box-whisker plot.

考 試 科 目	統 計 學	系 所 別	財 務 管 理 學 系	考 試 時 間	2 月 6 日 (星 期 二) 第 四 節
---------	-------	-------	-------------	---------	-------------------------

11. (5 %) Suppose that the P/E ratio of Software industry follows $N(40, 25)$, the P/E ratio of other industry follows $N(20, 25)$. Further, Software companies account for 10% of the total. $P(\text{P/E ratio} > 30) = ?$
- A. 0.094
B. 0.109
C. 0.118
D. 0.128
12. (5 %) (Cont. 11) If it is known that the P/E ratio of company A is greater than 30, what is the probability that A is a Software company?
- A. 0.69
B. 0.72
C. 0.77
D. 0.83
13. (5 %) In a sample data of 45 heart failure patients, there are three variables: time is the survival time (days) of the patient; sex is the gender of the patient; anaemia: whether the patient has anaemia. The following is the interaction plot, in which the Y-axis gives each group's mean survival time. What does it reveal in the plot?



- A. All the two main effects and interaction are likely significant.
B. Only the two main effects are likely significant.
C. Only the main effect anaemia is likely significant.
D. Only the main effect sex is likely significant.

考 試 科 目	統 計 學	系 所 別	財 務 管 理 學 系	考 試 時 間	2 月 6 日 (星期二) 第四節
---------	-------	-------	-------------	---------	---------------------

14. (5 %) (Cont. 13) Regardless of the previous findings, we consider the data analysis of a two-way ANOVA with interaction term. From a sample data of 45 heart failure patients, it's provided that $SS(\text{anaemia})=110$, $SS(\text{sex})=40$, $SS(\text{total})=700$ and $MSE=12$. The F-value of the interaction is around
- A. 3
B. 5
C. 7
D. 9
15. (5 %) The following are the EPS of a sample of 9 companies in year 2022, 2023 (in USD). Assume that EPS follows Normal distributions.

Company	Year 2022 (X)	Year 2023 (Y)
A	1.8	1.7
B	1.9	1.9
C	2.0	2.4
D	2.1	2.0
E	2.2	2.2
F	2.3	2.7
G	2.4	2.3
H	2.5	2.5
I	2.6	2.6
Sample mean	2.2	2.26
Sample variance	0.075	0.113

- Which of the following tests is appropriate to test whether EPS increases in 2023?
- A. One-sample t-test
B. Paired t-test
C. Two-sample t-test
D. Two-sample z-test
16. (5 %) (Cont. 15) To determine whether EPS increases, the observed test statistic is approximately
- A. 0.4 (or -0.4)
B. 0.6 (or -0.6)
C. 0.8 (or -0.8)
D. 1.0 (or -1.0).

考 試 科 目	統 計 學	系 所 別	財 務 管 理 學 系	考 試 時 間	2 月 6 日 (星 期 二) 第 四 節
---------	-------	-------	-------------	---------	-------------------------

17. (5 %) (Cont. 15) For the EPS data in Question 15, the followings are partial output of the simple linear regression model: $EPS_{2023} = \alpha + \beta \times EPS_{2022} + \epsilon$.

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	0.09222	0.61	■	0.88
x	■	0.27	■	0.01
Residual standard error: 0.21 on 7 degrees of freedom				

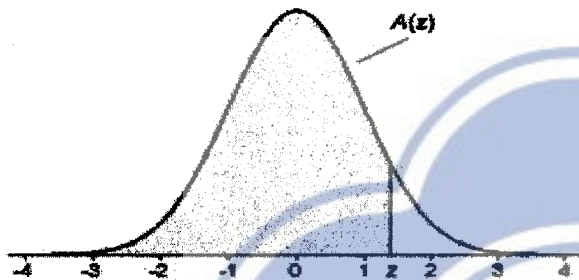
The slope estimate is

- A. 0.8
B. 0.9
C. 1.0
D. 1.1
18. (5 %) (Cont. 17) To test the linear effect of EPS_{2022} on EPS_{2023} , within which range does the p-value lie?
A. p-value < 0.01
B. 0.01 < p-value < 0.05
C. 0.05 < p-value < 0.10
D. 0.10 < p-value
19. (5 %) (Cont. 17) The adjusted R^2 is around
A. 0.6
B. 0.7
C. 0.8
D. 0.9
20. (5 %) In multiple linear regression, what do multicollinearity refer to?
A. A strong correlation among independent variables.
B. A strong correlation between dependent variable and only some independent variable.
C. A strong correlation among observations.
D. A strong correlation among residuals.

考試科目	統計學	系所別	財務管理學系	考試時間	2月6日(星期二)第四節
------	-----	-----	--------	------	--------------

Appendix:

Cumulative Standardized Normal Distribution



$A(z)$ is the integral of the standardized normal distribution from $-\infty$ to z (in other words, the area under the curve to the left of z). It gives the probability of a normal random variable not being more than z standard deviations above its mean. Values of z of particular importance:

z	$A(z)$	
1.645	0.9500	Lower limit of right 5% tail
1.960	0.9750	Lower limit of right 2.5% tail
2.326	0.9900	Lower limit of right 1% tail
2.576	0.9950	Lower limit of right 0.5% tail
3.090	0.9990	Lower limit of right 0.1% tail
3.391	0.9995	Lower limit of right 0.05% tail

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							

考 試 科 目	統 計 學	系 所 別	財 務 管 理 學 系	考 試 時 間	2 月 6 日 (星期二) 第四節
---------	-------	-------	-------------	---------	---------------------

t Distribution: Critical Values of t

Degrees of freedom	Two-tailed test: One-tailed test:	Significance level					
		10%	5%	2%	1%	0.2%	0.1%
		5%	2.5%	1%	0.5%	0.1%	0.05%
1		6.314	12.706	31.821	63.657	318.309	636.619
2		2.920	4.303	6.965	9.925	22.327	31.599
3		2.353	3.182	4.541	5.841	10.215	12.924
4		2.132	2.776	3.747	4.604	7.173	8.610
5		2.015	2.571	3.365	4.032	5.893	6.869
6		1.943	2.447	3.143	3.707	5.208	5.959
7		1.894	2.365	2.998	3.499	4.785	5.408
8		1.860	2.306	2.896	3.355	4.501	5.041
9		1.833	2.262	2.821	3.250	4.297	4.781
10		1.812	2.228	2.764	3.169	4.144	4.587
11		1.796	2.201	2.718	3.106	4.025	4.437
12		1.782	2.179	2.681	3.055	3.930	4.318
13		1.771	2.160	2.650	3.012	3.852	4.221
14		1.761	2.145	2.624	2.977	3.787	4.140
15		1.753	2.131	2.602	2.947	3.733	4.073
16		1.746	2.120	2.583	2.921	3.686	4.015
17		1.740	2.110	2.567	2.898	3.646	3.965
18		1.734	2.101	2.552	2.878	3.610	3.922
19		1.729	2.093	2.539	2.861	3.579	3.883
20		1.725	2.086	2.528	2.845	3.552	3.850

備

註

- 一、作答於試題上者，不予計分。
二、試題請隨卷繳交。