國立中山大學104學年度碩士暨碩士專班招生考試試題

科目名稱：統計學【財管系碩士班】　　題號：443003

※本科目依簡章規定「不可以」使用計算機(問答申論題)　　

統計學[財管系碩士班]

※本科試題共20小格，每小格5分，共計100分。

1. 每一空格答案須全對才給分。
2. 只需填入最後答案，不需寫出計算過程。
3. 無法整除者，最後答案以四捨五入法，請取到小數點後第三位。

答案卷請製作如下: 所有答案必須作答到答案本，不可在本試題卷上作答。

(1)	(2)	(3)
(4)	(5)	(6)
(7)	(8)	(9)
(10)	(11)	(12)
(13)	(14)	(15)
(16)	(17)	(18)
(19)	(20)	

◎共20格，每一個空格5分，共計100分。

#1. An investor constructs a portfolio consisting of 5 firms as following table.

Firm	Firm size (million dollars)	Expected return
A	100	8%
B	150	6%
C	300	5%
D	250	12%
E	200	9%

a. What is the equal-weighted mean of expected return of the portfolio? (1)

b. What is the weighted mean (according to firm size) of expected return of the portfolio? (2)

#2. To analyze how many hours students spend in reading per week, David surveyed 500 students between the ages of 15 and 18. The survey results are reported in the following table.

Hours of reading per week	Number of survey responses
Less than 1	16
1~5	46
6~10	132
11~15	153
16~20	83
21~25	42
26~30	20
31 or more	8

For a randomly selected student, compute the following.

a. The probability the student spends reading for less than 1 hour per week. (3)

b. The probability the student spends reading for at least 21 hours per week. (4)

c. The probability the student spends reading for 10 or fewer hours per week. (5)

#3. For some insurance company, the payment and the probability distribution for damage claims on collision insurance are shown as what follows.

Payment ($)	Probability
0	0.80
300	0.08
500	0.06
1200	0.05
3000	0.01

a. Use the expected collision payment to determine the collision insurance premium that ensure the company to make neither a profit nor a loss (i.e., break even).___(6)

b. Compute the variance of the payment.___(7)

#4. In a survey of a bank, one out of three investors have REIT (real estate investment trust) in their portfolios. Consider a sample of 10 investors.

a. Compute the probability that **exactly 2 investors** have REIT in their portfolios.
___(8)

b. Compute the probability that **at least 2 of the investors** have REIT in their portfolios.
___(9)

c. If you found that **exactly 9 of the investors** have REIT in their portfolios, would you doubt the accuracy of the survey results? **(yes or no?)**___(10)

d. Compute the expected number of investors who have REIT in their portfolios.
___(11)

#5. In landscaping of the Kasey's Nursery for residential areas, the estimated labor cost depends on the number of plantings of trees, shrubs, and so on. For cost-estimating purposes of some project, managers spend 3 hours of labor time on the planting of a medium-sized tree. There are actual times of 10 plantings during the past month (times in hours), as in follows.

3.2; 3.5; 3.1; 3.3; 3.1; 3.1; 2.9; 3.0; 2.8; 3.4

At the 5% significance level, please examine whether the mean tree-planting time (assume u) differs from 3 hours.

a. State the null and alternative hypotheses.___(12)

b. Compute the sample standard deviation.___(13)

c. Would you reject the null hypothesis at 5% significance level? **(yes or no?)**___(14)

#6. For the following five observations for two variables, x and y, the estimated regression equation for these data is $\hat{y} = 30 - 5x$.

x_i	1	3	1	1	4
y_i	20	15	30	25	10

a. Compute the sum of squares due to error (SSE).___(15)

b. Compute the coefficient of determination r^2 (R squared).___(16)

c. Compute the sample correlation coefficient.___(17)

#7. The manager of Adam Corporation wants to realize the relationship between the age of a car (x) and the annual maintenance cost (y). Herein, there are samples as follows.

Age of car (years): x	Maintance cost ($): y
1	200
1	300
3	600
2	500
2	400
3	800
4	700
5	900
4	1200
5	1000

a. Develop the least squares estimated regression equation. **(18)**

b. Test whether the slope is statistically significantly different from 0 at the 5% significance level **(yes or no).** **(19)**

c. Develop a 95% prediction interval for the maintenance cost for a specific car that is 3 years old. **(20)**

[以下還有可查詢的資料及表格]

[HINTS]

$\sqrt{10} \approx 3.162; \sqrt{0.424} \approx 0.651; \sqrt{0.8} \approx 0.894$

$\sqrt{8} \approx 2.828; \sqrt{202000} \approx 449.444; \sqrt{20} \approx 4.472$

$\sqrt{1.1} \approx 1.049; \sqrt{0.9} \approx 0.949; \sqrt{1.8} \approx 1.342$

$\sqrt{202} \approx 14.213; \sqrt{660} \approx 25.690; \sqrt{30} \approx 5.477$

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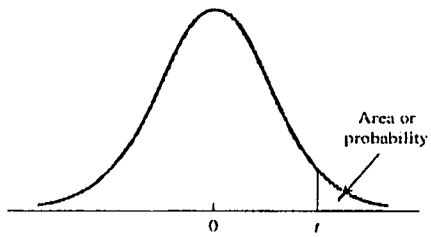
t distribution



Entries in the table give t values for an area or probability in the upper tail of the t distribution. For example, with 10 degrees of freedom and a .05 area in the upper tail, $t_{.05} = 1.812$.

Degrees of Freedom	Area in Upper Tail .20	.10	.05	.025	.01	.005
1	1.376	3.078	6.314	12.706	31.821	63.656
2	1.061	1.886	2.920	4.303	6.965	9.925
3	.978	1.638	2.353	3.182	4.541	5.841
4	.941	1.533	2.132	2.776	3.747	4.604
5	.920	1.476	2.015	2.571	3.365	4.032
6	.906	1.440	1.943	2.447	3.143	3.707
7	.896	1.415	1.895	2.365	2.998	3.499
8	.889	1.397	1.860	2.306	2.896	3.355
9	.883	1.383	1.833	2.262	2.821	3.250
10	.879	1.372	1.812	2.228	2.764	3.169
11	.876	1.363	1.796	2.201	2.718	3.106
12	.873	1.356	1.782	2.179	2.681	3.055
13	.870	1.350	1.771	2.160	2.650	3.012
14	.868	1.345	1.761	2.145	2.624	2.977