

(一) 選擇題：(每題四分，共六十分)

Using the following statistics, answer problems (1) to (3).

$$\Sigma x = 137, \quad \Sigma y = 253, \quad n = 25, \quad \Sigma xy = 1,609, \quad \Sigma x^2 = 895, \quad \Sigma y^2 = 2,943.$$

- (1) A least squares line was derived, what is the slope of this line?
a. 2.11 b. 1.54 c. 3.01 d. 1.66 e. 2.83
- (2) A least squares line was derived, what is the intercept of this line?
a. 2.11 b. 1.54 c. 3.01 d. 1.66 e. 2.83
- (3) A 95% confidence interval for the mean value of Y at X = 6.0 was derived (say, from A to B). What is the value of B?
a. 13.57 b. 10.16 c. 12.05 d. 11.48 e. 14.14
- (4) For the following statements about a confidence interval (CI), which is (are) true?
(i) The narrower the CI, the better, for the same level of confidence.
(ii) The narrower the CI, the higher the confidence level.
(iii) A 95% CI for the mean of population implies a .95 probability that the mean of the population lies in that interval.
a. (i)(ii)(iii) b. (i)(iii) c. (i) d. (i)(ii) e. none.
- (5) For the following statements about the Central Limit Theory (CLT), which is (are) true?
(i) When you are sampling with replacement from a finite population, the CLT does not hold.
(ii) The CLT tells us that the sample mean tends toward a normal distribution as the sample size decreases.
(iii) As the sample size increases, the variability of the sample mean increase.
a. (i)(ii)(iii) b. (i)(iii) c. (i) d. (i)(ii) e. none.
- For a data set 32, 7, 34, 21, 12, 15, 30, 23, 17, 19, answer problem (6) to (7).
- (6) The coefficient of variation of this data is
a. 71.6 b. 42.2 c. 23.0 d. 55.6 e. 84.1
- (7) The data set appears to be _____.
a. perfectly symmetric about the mean b. skewed to the right
c. skewed to the left d. uniformly skewed
e. perfectly symmetric about the 15.
- (8) Detecting sample outliers in multiple regression can be done using _____.
a. sample leverages. b. standardized residuals.
c. Cook's distance measure. d. both a & b. e. both b & c.

(背面仍有題目,請繼續作答)

A partial printout for the regression analysis is given, answer problems (9) to (12).

<u>Source</u>	<u>DF</u>	<u>SS</u>	<u>MS</u>
Regression		225.23	
Error			
Total	22	326.45	

<u>Parameter</u>	<u>Estimate</u>	<u>Std. Error</u>
Intercept	140.56	
X1	5.62	.276
X2	8.96	3.678

- (9) What is the value of coefficient of determination?
a. .542 b. .975 c. .892 d. .783 e. .690
- (10) What is the value of the test statistic for testing $H_0: \beta_2 = 0$?
a. 20.36 b. 4.672 c. 5.691 d. 2.436 e. 2.089
- (11) What is the critical value for testing the overall adequacy of the model at a 0.05 level of significance?
a. 3.49 b. 3.44 c. 3.52 d. 6.94 e. 4.41
- (12) Calculate the 95% confidence interval for β_1 ?
a. 5.344 to 5.896 b. 5.044 to 6.196 c. 4.238 to 8.451
d. 6.942 to 7.976 e. 4.415 to 9.076
- (13) A shipment of 1,000 diskettes arrives at a computer store. The store policy is to accept the shipment if no more than one out of a random sample of five diskettes is found to be bad. What is the probability of accepting the shipment if 5% of the diskettes are faulty?
a. 0.774 b. 0.204 c. 0.021 d. 0.978 e. 0.225
- (14) For the following statements about hypothesis testing, which is (are) true?
(i) In hypothesis testing, the smaller the type I error, the larger the type II error.
(ii) The p -value is the smallest value of type I error for which you fail to reject H_0 .
(iii) The P (rejecting H_0 when H_0 is false) is referred to as the power of test.
a. (i)(ii)(iii) b. (i)(iii) c. (i) d. (i)(ii) e. none.
- (15) XYZ Motors want to test its truck motors for fuel economy (at least 10 mpg). A sample of 150 motors is tested and 14 motors are found to get less than 10 mpg. If a purchaser of the motors wants to know within 3% the proportion of motors that get better than 10 mpg with 95% confidence, what sample size is needed?
a. 30 b. 150 c. 20 d. 12 e. 363

(二) 計算題：

- The random variable X is normally distributed.
 - The mean is μ and variance is σ^2 . Find k if $P(\mu - k\sigma \leq X \leq \mu + k\sigma) = .67$. (3 分)
 - The mean is 25, find the variance if $P(X \geq 29) = .27$. (4 分)
 - If $P(X \leq 10) = .12$ and $P(X \geq 15) = .4$. Find the mean and variance of the random variable X . (3,3 分)
- A statistician reported to a car insurance company a confidence interval for the proportion of convertible cars (p) that had been involved in major accidents during the past year. The 95% confidence interval for p was reported to be the interval from .10 to .36.
 - What is the statistician's estimate of p ? (3 分)
 - What is the maximum error of estimate of the proportion for this confidence interval? (3 分)
 - Approximately what sample size did the statistician use? (4 分)
- 隨機抽 18 名工人，任意分成三組分別實施 A. B. C 三種訓練方法，訓練完後分別測試每人成績（每小時生產量）資料如下：

A	36	26	31	20	34	25
B	40	29	38	32	39	34
C	32	18	23	21	33	27

由此數據檢定三種訓練方法的效果有無顯著差異，設 $\alpha = 0.05$ ？並找出 B 與 C 兩種訓練所得平均成績差額的 95% 信賴區間？(12, 5 分)

(三) 附表：

(1)
大表

Degrees of Freedom	Area in Upper Tail				
	.10	.05	.025	.01	.005
10	1.372	1.812	2.228	2.764	3.169
11	1.363	1.796	2.201	2.718	3.106
12	1.356	1.782	2.179	2.681	3.055
13	1.350	1.771	2.160	2.650	3.012
14	1.345	1.761	2.145	2.624	2.977
15	1.341	1.753	2.131	2.602	2.947
16	1.337	1.746	2.120	2.583	2.921
17	1.333	1.740	2.110	2.567	2.898
18	1.330	1.734	2.101	2.552	2.878
19	1.328	1.729	2.093	2.539	2.861
20	1.325	1.725	2.086	2.528	2.845
21	1.323	1.721	2.080	2.518	2.831
22	1.321	1.717	2.074	2.508	2.819
23	1.319	1.714	2.069	2.500	2.807
24	1.318	1.711	2.064	2.492	2.797

(背面仍有題目,請繼續作答)

表中的數值代表介於平均數與 z 之間的面積

(2) z 表

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2518	.2549
.7	.2580	.2612	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
.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

Table of $F_{.05}$ Values

(3) F 表

Denominator Degrees of Freedom	Numerator Degrees of Freedom												
	1	2	3	4	5	6	7	8	9	10	12	15	20
1	161.4	199.5	215.7	224.6	230.2	234.0	236.8	238.9	240.5	241.9	243.9	245.9	248.0
2	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38	19.40	19.41	19.43	19.45
3	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81	8.79	8.74	8.70	8.66
4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	5.96	5.91	5.86	5.80
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	4.74	4.68	4.62	4.56
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	4.06	4.00	3.94	3.87
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.64	3.57	3.51	3.44
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	3.35	3.28	3.22	3.15
9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.14	3.07	3.01	2.94
10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.98	2.91	2.85	2.77
11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90	2.85	2.79	2.72	2.65
12	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80	2.75	2.69	2.62	2.54
13	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71	2.67	2.60	2.53	2.46
14	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65	2.60	2.53	2.46	2.39
15	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59	2.54	2.48	2.40	2.33
16	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54	2.49	2.42	2.35	2.28
17	4.45	3.59	3.20	2.96	2.81	2.70	2.61	2.55	2.49	2.45	2.38	2.31	2.23
18	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46	2.41	2.34	2.27	2.19
19	4.38	3.52	3.13	2.90	2.74	2.63	2.54	2.48	2.42	2.38	2.31	2.23	2.16
20	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39	2.35	2.28	2.20	2.12
21	4.32	3.47	3.07	2.84	2.68	2.57	2.49	2.42	2.37	2.32	2.25	2.18	2.10
22	4.30	3.44	3.05	2.82	2.66	2.55	2.46	2.40	2.34	2.30	2.23	2.15	2.07