

明新科技大學 98 學年度研究所招生考試 試題卷

| 系所名稱 | 類別 | 科目 | 節次 | 准考證號碼 (考生請填入) | 考試日期 |
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| 工程管理研究所 | 碩士班 | 統計學 | 第一節 | | 98/5/3 |

※答案須寫在答案卷內，否則不予計分。

可使用計算機(需不具程式儲存功能)，不可使用翻譯機、字典

選擇題(請選擇其中最正確的答案，四選一，共 20 題，不倒扣，合計 80 分)

1. 已知隨機變數 X 的機率函數為

| | | | | |
|----------|-----|-----|-----|-----|
| x | 1 | 2 | 3 | 4 |
| $P(X=x)$ | 0.4 | 0.3 | 0.2 | 0.1 |

變數 $Y = -3X^2 + 2$ ，則 Y 的期望值等於 (A) -13 (B) -4 (C) 4 (D) 0

2. 假設二號高速公路每天發生車禍的次數遵循 Poisson 分配，且平均每天發生 1 次車禍，則下星期五在二號高速公路發生 1 次車禍的機率約為 (A) 0.06 (B) 0.14 (C) 0.25 (D) 0.37

3. 假設 $E(X) = 2$ 、 $E(Y) = 3$ 、 $E(XY) = 9$ ，則 $Cov(X, Y) =$ (A) $\frac{2}{3}$ (B) 1.5 (C) 2 (D) 3

4. 假設二項隨機變數 $X \sim Bin(n=4, p=0.3)$ 與 $Y \sim Bin(n=3, p=0.4)$ 獨立，則變異數 $Var(X+Y)$ 等於 (A) 0.84 (B) 1.56 (C) 1.68 (D) 2.40

5. 已知隨機變數 X 的機率函數為 $f(x) = 4e^{-4x}$ ， $x > 0$ ；則機率 $P(X \leq 0.25)$ 約等於 (A) 0.63 (B) 0.45 (C) 0.23 (D) 0.11

6. 已知 X 與 Y 的聯合機率函數如下：

| | | | | |
|-----|---|------|------|------|
| | | y | | |
| | | 0 | 1 | 2 |
| x | 0 | 0.10 | 0.15 | 0.20 |
| | 1 | 0.05 | 0.10 | 0.15 |
| | 2 | 0.15 | 0.05 | 0.05 |

則條件期望值 $E(Y|X=2)$ 等於 (A) 0.6 (B) 0.3 (C) 0.25 (D) 0.15

7. 對於卡方分配下列何者為假？

(A) 隨機變數的值不為負的

(B) $Z \sim N(0,1), Z^2 = \chi^2(1)$

(C) $(n-1)s^2 / \sigma^2$ 的抽樣分配為卡方分配

(D) 其分配為對稱的

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8. 對母體平均數進行區間估計時，估計誤差為 e ，顯著水準為 α ，樣本大小為 n ，三者的關係為
- (A) e, α, n 三者沒關係
 (B) n 不變， α 越小則 e 越小
 (C) n 不變， α 越小則 e 越大
 (D) α 不變， n 越大則 e 越大
9. 下列敘述何者為真？
- (A) 樣本觀察值之全距越大時其眾數、中位數、平均數也會越大
 (B) 檢力是指能正確拒絕虛無假設之機率
 (C) 信賴係數 99% 的信賴區間可能包含母體參數的機率較 95% 的信賴區間來得高，精確度也高
 (D) 任一母體參數可能有多個不偏估計量，但一致估計量是唯一的
10. 某校有學生 10000 人，全校平均體重為 56 公斤，標準差為 4 公斤，現隨機抽出 25 人來當樣本，此 25 位學生之變異數超過 24.25 的機率最接近下列何數值？
- (A) 0.05 (B) 0.025 (C) 0.01 (D) 0.005
11. 某產品之不良率為 0.1，現隨機抽取 100 個樣本，則樣本比例介於 0.08 至 0.125 間之機率最接近下列何數值？
- (A) 0.0513 (B) 0.167 (C) 0.403 (D) 0.545
12. 從一已知變異數 100 之常態母體中隨機抽出一組樣本，若平均數之 95% 信賴區間為 (17.2, 22.8)，則樣本有多大？
- (A) 54 (B) 49 (C) 35 (D) 21
13. 某產品之規格為 15 公分，從其中隨機抽出 10 個進行檢驗，得平均數為 12.5 公分，標準差為 1.5 公分，則全部產品之標準差的 90% 信賴區間為何？
- (A) (1.12, 2.39) (B) (1.2, 6.09) (C) (1.09, 2.47) (D) (1.23, 5.71)

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14. 研究三種不同包裝對銷售量的影響，進行了試賣活動得到以下的 ANOVA 表：則

| 變異來源 | 平方和 | 自由度 | 均方 | F-比值 |
|------|-----|-----|----|------|
| 處理方式 | 甲 | 丙 | 24 | 戊 |
| 殘差 | 乙 | 15 | 丁 | |
| 總和 | 138 | | | |

- (A) 乙 - 甲 = 52
 (B) 甲 + 丙 = 35
 (C) 丁 + 丙 = 8
 (D) 甲 - 丁 = 28

15. 承上題，若 $F_{0.05}(1,15) = 4.5431, F_{0.05}(2,15) = 3.6823, F_{0.05}(3,15) = 3.0556,$

$$F_{0.05}(1,16) = 4.494, F_{0.05}(2,16) = 3.6337, F_{0.05}(3,16) = 3.2389,$$

$$F_{0.05}(1,17) = 4.4513, F_{0.05}(2,17) = 3.5915, F_{0.05}(3,17) = 3.1968,$$

$$F_{0.05}(1,18) = 4.4139, F_{0.05}(2,18) = 3.5546, F_{0.05}(3,18) = 3.1599, \text{ 則}$$

- (A) 戊 = 5
 (B) 當 $\alpha = 0.05$ 時可以推論不同包裝對銷售量有影響
 (C) 當 $\alpha = 0.05$ 時可以推論不同包裝對銷售量無影響
 (D) 當 $\alpha = 0.1$ 時可以推論不同包裝對銷售量無影響

16. 假設兩母體皆為常態分配，且由樣本資料計算得知

$$\bar{x} = 5.20, s_1^2 = 0.9988, n_1 = 10$$

$$\bar{y} = 6.45, s_2^2 = 1.0223, n_2 = 10$$

進行檢定 $H_0: \sigma_1^2 = \sigma_2^2, H_1: \sigma_1^2 \neq \sigma_2^2$ 時應用何種分配?

- (A) T 分配 (B) 卡方分配 (C) F 分配 (D) 常態分配

17. 變異數分析(ANOVA)是統計學上的重要分析技術，其基本假設為何?

- (a) 每一因子水準(或處理)所對應的機率分配皆服從常態分配。
 (b) 每一因子水準中所觀察之資料皆隨機獨立。
 (c) 每一因子水準所對應之分配皆具有相同之變異數。

- (A) (a)(b)
 (B) (b)(c)
 (C) (a)(c)
 (D) 以上皆是

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18. Let X and Y be two random variables with means μ_x, μ_y , and variances σ_x^2 and σ_y^2 respectively. A sample with n observations is drawn from X and another sample with m observations is drawn from Y . Consider the following condition.

- (a) X is normally distributed.
- (b) Y is normally distributed.
- (c) n is greater than 30.
- (d) m is greater than 30.
- (e) value of σ_x^2 is known.
- (f) value of σ_y^2 is known.
- (g) $\sigma_x^2 = \sigma_y^2$

What are the minimum necessary conditions to test $H_0: \mu_y = 1.5$ using T-test?

- (A) (b)
- (B) (f)
- (C) (b) and (f)
- (D) (b) (d) and (f)

19. [Continued] What are the minimum necessary conditions to test $H_0: \mu_x = \mu_y$ using Z-test?

- (A) (a) and (b)
- (B) (c) and (d)
- (C) (a)(b)(c) and (d)
- (D) All of the above

20. 假設兩獨立樣本各有 20 名受試者，且其母體變異數沒有差異，現在作平均數差異顯著性考驗時，則其自由度是多少？

- (A) 19 (B) 38 (C) 39 (D) 以上皆非

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計算題 (每題 10 分)

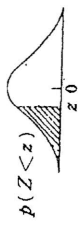
- 行銷公司對客戶收費是根據調查平均時間少於 15 分鐘可完成與否來決定，假若超過平均時間則需額外收費。現抽出 36 個調查樣本，若
 - 樣本平均時間為 17 分鐘，標準差為 5 分鐘，請問是否應額外收費？(信賴水準為 95%)
 - 當真正平均時間為 16 分鐘時，則犯型 II 錯誤的機率是多少？
- Eighteen overweight individuals were randomly assigned to one of three diets. After two months, the total weight losses (in pounds) of the individuals on each of the diets were listed in the following table. The null hypothesis to be tested is the mean effects of the three diets are the same.

| Weight loss | | |
|-------------|--------|--------|
| Diet 1 | Diet 2 | Diet 3 |
| 22 | 25 | 28 |
| 23 | 26 | 29 |
| 24 | 27 | 30 |
| 25 | 28 | 31 |
| 26 | 29 | 32 |
| 27 | 30 | 33 |

- Give the hypothesis.
- Construct the ANOVA table.
- Conclusion. ($\alpha=0.05$)

| | | | | | |
|---------|-----|-----|-----|------------------|--------|
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(續)



常態分配

| z | .00 | .01 | .02 | .03 | .04 | .05 | .06 | .07 | .08 | .09 |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| -3.5 | .0002 | .0002 | .0002 | .0002 | .0002 | .0002 | .0002 | .0002 | .0002 | .0002 |
| -3.4 | .0003 | .0003 | .0003 | .0003 | .0003 | .0003 | .0003 | .0003 | .0003 | .0002 |
| -3.3 | .0005 | .0005 | .0004 | .0004 | .0004 | .0004 | .0004 | .0004 | .0004 | .0003 |
| -3.2 | .0007 | .0007 | .0006 | .0006 | .0006 | .0006 | .0006 | .0005 | .0005 | .0005 |
| -3.1 | .0010 | .0009 | .0009 | .0008 | .0008 | .0008 | .0008 | .0007 | .0007 | .0007 |
| -3.0 | .0013 | .0013 | .0012 | .0012 | .0011 | .0011 | .0011 | .0010 | .0010 | .0010 |
| -2.9 | .0019 | .0018 | .0018 | .0017 | .0016 | .0016 | .0015 | .0014 | .0014 | .0014 |
| -2.8 | .0026 | .0025 | .0024 | .0023 | .0023 | .0022 | .0021 | .0021 | .0020 | .0019 |
| -2.7 | .0035 | .0034 | .0033 | .0032 | .0031 | .0030 | .0029 | .0028 | .0027 | .0026 |
| -2.6 | .0047 | .0045 | .0044 | .0043 | .0041 | .0040 | .0039 | .0038 | .0037 | .0036 |
| -2.5 | .0062 | .0060 | .0059 | .0057 | .0055 | .0054 | .0052 | .0051 | .0049 | .0048 |
| -2.4 | .0082 | .0080 | .0078 | .0075 | .0073 | .0071 | .0069 | .0068 | .0066 | .0064 |
| -2.3 | .0107 | .0104 | .0102 | .0099 | .0096 | .0094 | .0091 | .0089 | .0087 | .0084 |
| -2.2 | .0139 | .0136 | .0132 | .0129 | .0125 | .0122 | .0119 | .0116 | .0113 | .0110 |
| -2.1 | .0179 | .0174 | .0170 | .0166 | .0162 | .0158 | .0154 | .0150 | .0146 | .0143 |
| -2.0 | .0228 | .0222 | .0217 | .0212 | .0207 | .0202 | .0197 | .0192 | .0188 | .0183 |
| -1.9 | .0287 | .0281 | .0274 | .0268 | .0262 | .0256 | .0250 | .0244 | .0239 | .0233 |
| -1.8 | .0359 | .0351 | .0344 | .0336 | .0329 | .0322 | .0314 | .0307 | .0301 | .0294 |
| -1.7 | .0446 | .0436 | .0427 | .0418 | .0409 | .0401 | .0392 | .0384 | .0375 | .0367 |
| -1.6 | .0548 | .0537 | .0526 | .0516 | .0505 | .0495 | .0485 | .0475 | .0465 | .0455 |
| -1.5 | .0668 | .0655 | .0643 | .0630 | .0618 | .0606 | .0594 | .0582 | .0571 | .0559 |
| -1.4 | .0808 | .0793 | .0778 | .0764 | .0749 | .0735 | .0721 | .0708 | .0694 | .0681 |
| -1.3 | .0968 | .0951 | .0934 | .0918 | .0901 | .0885 | .0869 | .0853 | .0838 | .0823 |
| -1.2 | .1151 | .1131 | .1112 | .1093 | .1075 | .1056 | .1038 | .1020 | .1003 | .0985 |
| -1.1 | .1357 | .1335 | .1314 | .1292 | .1271 | .1251 | .1230 | .1210 | .1190 | .1170 |
| -1.0 | .1587 | .1562 | .1539 | .1515 | .1492 | .1469 | .1446 | .1423 | .1401 | .1379 |
| -0.9 | .1841 | .1814 | .1788 | .1762 | .1736 | .1711 | .1685 | .1660 | .1635 | .1611 |
| -0.8 | .2119 | .2090 | .2061 | .2033 | .2007 | .1977 | .1949 | .1922 | .1894 | .1867 |
| -0.7 | .2420 | .2389 | .2358 | .2327 | .2297 | .2266 | .2236 | .2206 | .2177 | .2148 |
| -0.6 | .2743 | .2709 | .2676 | .2643 | .2611 | .2578 | .2546 | .2514 | .2483 | .2451 |
| -0.5 | .3085 | .3050 | .3015 | .2981 | .2946 | .2912 | .2877 | .2843 | .2810 | .2776 |
| -0.4 | .3446 | .3409 | .3372 | .3336 | .3300 | .3264 | .3228 | .3192 | .3156 | .3121 |
| -0.3 | .3821 | .3783 | .3745 | .3707 | .3669 | .3632 | .3594 | .3557 | .3520 | .3483 |
| -0.2 | .4207 | .4168 | .4129 | .4090 | .4052 | .4013 | .3974 | .3936 | .3897 | .3859 |
| -0.1 | .4602 | .4562 | .4522 | .4483 | .4443 | .4404 | .4364 | .4325 | .4286 | .4247 |
| 0.0 | .5000 | .4960 | .4920 | .4880 | .4840 | .4801 | .4761 | .4721 | .4681 | .4641 |
| 0.1 | .5000 | .5040 | .5080 | .5120 | .5160 | .5199 | .5239 | .5279 | .5319 | .5359 |
| 0.2 | .5398 | .5438 | .5478 | .5517 | .5557 | .5596 | .5636 | .5675 | .5714 | .5753 |
| 0.3 | .5793 | .5832 | .5871 | .5910 | .5948 | .5987 | .6026 | .6064 | .6103 | .6141 |
| 0.4 | .6179 | .6217 | .6255 | .6293 | .6331 | .6368 | .6406 | .6443 | .6480 | .6517 |
| 0.5 | .6554 | .6591 | .6628 | .6664 | .6700 | .6736 | .6772 | .6808 | .6844 | .6879 |
| 0.6 | .6915 | .6950 | .6985 | .7019 | .7054 | .7088 | .7123 | .7157 | .7190 | .7224 |
| 0.7 | .7257 | .7291 | .7324 | .7357 | .7389 | .7422 | .7454 | .7486 | .7517 | .7549 |
| 0.8 | .7580 | .7611 | .7642 | .7673 | .7703 | .7734 | .7764 | .7794 | .7823 | .7852 |
| 0.9 | .7881 | .7910 | .7939 | .7967 | .7995 | .8023 | .8051 | .8078 | .8106 | .8133 |
| 1.0 | .8159 | .8186 | .8212 | .8238 | .8264 | .8289 | .8315 | .8340 | .8365 | .8389 |
| 1.1 | .8413 | .8438 | .8461 | .8485 | .8508 | .8531 | .8554 | .8577 | .8599 | .8621 |
| 1.2 | .8643 | .8665 | .8686 | .8708 | .8729 | .8749 | .8770 | .8790 | .8810 | .8830 |
| 1.3 | .8849 | .8869 | .8888 | .8907 | .8925 | .8944 | .8962 | .8980 | .8997 | .9015 |
| 1.4 | .9032 | .9049 | .9066 | .9082 | .9099 | .9115 | .9131 | .9147 | .9162 | .9177 |
| 1.5 | .9192 | .9207 | .9222 | .9236 | .9251 | .9265 | .9279 | .9292 | .9306 | .9319 |
| 1.6 | .9332 | .9345 | .9357 | .9370 | .9382 | .9394 | .9406 | .9418 | .9429 | .9441 |
| 1.7 | .9452 | .9463 | .9474 | .9484 | .9495 | .9505 | .9515 | .9525 | .9535 | .9545 |
| 1.8 | .9554 | .9564 | .9573 | .9582 | .9591 | .9599 | .9608 | .9616 | .9625 | .9633 |
| 1.9 | .9641 | .9649 | .9656 | .9664 | .9671 | .9678 | .9686 | .9693 | .9700 | .9706 |
| 2.0 | .9713 | .9719 | .9726 | .9732 | .9738 | .9744 | .9750 | .9756 | .9761 | .9767 |
| 2.1 | .9772 | .9778 | .9783 | .9788 | .9793 | .9798 | .9803 | .9808 | .9812 | .9817 |
| 2.2 | .9821 | .9826 | .9830 | .9834 | .9838 | .9842 | .9846 | .9850 | .9854 | .9857 |
| 2.3 | .9861 | .9864 | .9868 | .9871 | .9875 | .9878 | .9881 | .9884 | .9887 | .9890 |
| 2.4 | .9893 | .9896 | .9898 | .9901 | .9904 | .9906 | .9909 | .9911 | .9913 | .9916 |
| 2.5 | .9918 | .9920 | .9922 | .9925 | .9927 | .9929 | .9931 | .9932 | .9934 | .9936 |
| 2.6 | .9938 | .9940 | .9941 | .9943 | .9945 | .9946 | .9948 | .9949 | .9951 | .9952 |
| 2.7 | .9953 | .9955 | .9956 | .9957 | .9959 | .9960 | .9961 | .9962 | .9963 | .9964 |
| 2.8 | .9965 | .9966 | .9967 | .9968 | .9969 | .9970 | .9971 | .9972 | .9973 | .9974 |
| 2.9 | .9974 | .9975 | .9976 | .9977 | .9977 | .9978 | .9979 | .9979 | .9980 | .9981 |
| 3.0 | .9981 | .9982 | .9982 | .9983 | .9984 | .9984 | .9985 | .9985 | .9986 | .9986 |
| 3.1 | .9987 | .9987 | .9987 | .9988 | .9988 | .9989 | .9989 | .9989 | .9990 | .9990 |
| 3.2 | .9990 | .9991 | .9991 | .9991 | .9992 | .9992 | .9992 | .9992 | .9993 | .9993 |
| 3.3 | .9993 | .9993 | .9994 | .9994 | .9994 | .9994 | .9994 | .9995 | .9995 | .9995 |
| 3.4 | .9995 | .9995 | .9995 | .9996 | .9996 | .9996 | .9996 | .9996 | .9997 | .9997 |
| 3.5 | .9997 | .9997 | .9997 | .9997 | .9997 | .9997 | .9997 | .9997 | .9997 | .9998 |
| 3.6 | .9998 | .9998 | .9998 | .9998 | .9998 | .9998 | .9998 | .9998 | .9998 | .9998 |

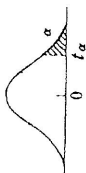
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| 工程管理研究所 | 碩士班 | 統計學 | 第一節 | | 98/5/3 |

χ^2 一分配右尾百分點 $\chi^2_{\alpha}(d.f.)$



| d.f. | .995 | .990 | .975 | .950 | .925 | .900 | .875 | .850 | .825 | .800 | .775 | .750 | .725 | .700 | .675 | .650 | .625 | .600 | .575 | .550 | .525 | .500 | |
|------|-----------|----------|----------|----------|---------|---------|---------|---------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--|
| 1 | 392704 | 157088 | 982069 | 393214 | 3.84146 | 5.02389 | 6.63490 | 7.87944 | | | | | | | | | | | | | | | |
| 2 | 0.000251 | 0.001007 | 0.006356 | 0.02587 | 5.99147 | 7.37776 | 9.21034 | 10.5966 | | | | | | | | | | | | | | | |
| 3 | 0.0717212 | 0.114832 | 0.215795 | 0.351846 | 7.81473 | 9.34840 | 11.3449 | 12.8381 | | | | | | | | | | | | | | | |
| 4 | 0.206990 | 0.297110 | 0.484419 | 0.710721 | 9.48773 | 11.1433 | 13.2767 | 14.8602 | | | | | | | | | | | | | | | |
| 5 | 0.411740 | 0.554300 | 0.812111 | 1.145476 | 11.0705 | 12.8325 | 15.0863 | 16.7496 | | | | | | | | | | | | | | | |
| 6 | 0.675277 | 0.872085 | 1.237347 | 1.63539 | 12.5916 | 14.4494 | 16.8119 | 18.5476 | | | | | | | | | | | | | | | |
| 7 | 0.989265 | 1.239043 | 1.68987 | 2.16735 | 14.0671 | 16.0128 | 18.4753 | 20.2777 | | | | | | | | | | | | | | | |
| 8 | 1.344419 | 1.646482 | 2.17973 | 2.73264 | 15.5073 | 17.5346 | 20.0902 | 21.9850 | | | | | | | | | | | | | | | |
| 9 | 1.734926 | 2.087912 | 2.70039 | 3.32511 | 16.9190 | 19.0228 | 21.6660 | 23.5893 | | | | | | | | | | | | | | | |
| 10 | 2.15585 | 2.55821 | 3.24697 | 3.94030 | 18.3070 | 20.4831 | 23.2093 | 25.1882 | | | | | | | | | | | | | | | |
| 11 | 2.60321 | 3.05347 | 3.81575 | 4.57481 | 19.6751 | 21.9200 | 24.7250 | 26.7569 | | | | | | | | | | | | | | | |
| 12 | 3.07382 | 3.57056 | 4.40379 | 5.22603 | 21.0261 | 23.3367 | 26.2170 | 28.2995 | | | | | | | | | | | | | | | |
| 13 | 3.56503 | 4.10691 | 5.00874 | 5.89186 | 22.3621 | 24.7356 | 27.6883 | 29.8194 | | | | | | | | | | | | | | | |
| 14 | 4.07468 | 4.66043 | 5.62872 | 6.57063 | 23.6848 | 26.1190 | 29.1413 | 31.3193 | | | | | | | | | | | | | | | |
| 15 | 4.60094 | 5.22935 | 6.26214 | 7.26094 | 24.9958 | 27.4884 | 30.5779 | 32.8013 | | | | | | | | | | | | | | | |
| 16 | 5.14224 | 5.81221 | 6.90766 | 7.96164 | 26.2962 | 28.8454 | 31.9999 | 34.2672 | | | | | | | | | | | | | | | |
| 17 | 5.69724 | 6.40776 | 7.56418 | 8.67176 | 27.5871 | 30.1910 | 33.4087 | 35.7185 | | | | | | | | | | | | | | | |
| 18 | 6.26481 | 7.01491 | 8.23075 | 9.39046 | 28.8693 | 31.5264 | 34.8053 | 37.1564 | | | | | | | | | | | | | | | |
| 19 | 6.84398 | 7.63273 | 8.90655 | 10.1170 | 30.1435 | 32.8523 | 36.1908 | 38.5822 | | | | | | | | | | | | | | | |
| 20 | 7.43386 | 8.26040 | 9.59083 | 10.8508 | 31.4104 | 34.1696 | 37.5662 | 39.9968 | | | | | | | | | | | | | | | |
| 21 | 8.03366 | 8.89720 | 10.28293 | 11.5913 | 32.6705 | 35.4789 | 38.9321 | 41.4010 | | | | | | | | | | | | | | | |
| 22 | 8.64272 | 9.54249 | 10.9823 | 12.3380 | 33.9244 | 36.7807 | 40.2894 | 42.7956 | | | | | | | | | | | | | | | |
| 23 | 9.26042 | 10.19567 | 11.6885 | 13.0905 | 35.1725 | 38.0757 | 41.6384 | 44.1813 | | | | | | | | | | | | | | | |
| 24 | 9.88623 | 10.8564 | 12.4011 | 13.8484 | 36.4151 | 39.3641 | 42.9798 | 45.5585 | | | | | | | | | | | | | | | |
| 25 | 10.5197 | 11.5240 | 13.1197 | 14.6114 | 37.6525 | 40.6465 | 44.3141 | 46.9278 | | | | | | | | | | | | | | | |
| 26 | 11.1603 | 12.1981 | 13.8439 | 15.3791 | 38.8852 | 41.9232 | 45.6417 | 48.2899 | | | | | | | | | | | | | | | |
| 27 | 11.8076 | 12.8786 | 14.5733 | 16.1513 | 40.1133 | 43.1944 | 46.9630 | 49.6449 | | | | | | | | | | | | | | | |
| 28 | 12.4613 | 13.5648 | 15.3079 | 16.9279 | 41.3372 | 44.4607 | 48.2782 | 50.9933 | | | | | | | | | | | | | | | |
| 29 | 13.1211 | 14.2565 | 16.0471 | 17.7093 | 42.5569 | 45.7222 | 49.5879 | 52.3356 | | | | | | | | | | | | | | | |
| 30 | 13.7867 | 14.9535 | 16.7908 | 18.4926 | 43.7729 | 46.9792 | 50.8922 | 53.6720 | | | | | | | | | | | | | | | |
| 40 | 20.7065 | 22.1643 | 24.4331 | 26.5093 | 53.7865 | 59.3417 | 63.6907 | 66.7659 | | | | | | | | | | | | | | | |
| 50 | 27.9907 | 29.7067 | 32.3574 | 34.7642 | 67.5048 | 71.4212 | 76.1539 | 79.4900 | | | | | | | | | | | | | | | |
| 60 | 35.5346 | 37.4848 | 40.4817 | 43.1879 | 79.0819 | 83.2976 | 88.3794 | 91.9517 | | | | | | | | | | | | | | | |
| 70 | 43.2752 | 45.4418 | 48.7576 | 51.7393 | 90.5312 | 95.0231 | 100.425 | 104.215 | | | | | | | | | | | | | | | |
| 80 | 51.1720 | 53.5409 | 57.1532 | 60.3915 | 101.879 | 106.629 | 112.329 | 116.321 | | | | | | | | | | | | | | | |
| 90 | 59.1963 | 61.7541 | 65.6466 | 69.1260 | 113.145 | 118.136 | 124.116 | 128.299 | | | | | | | | | | | | | | | |
| 100 | 67.3276 | 70.1648 | 74.2219 | 77.9295 | 124.342 | 129.561 | 135.807 | 140.169 | | | | | | | | | | | | | | | |

t 一分配右尾百分點 $t_{\alpha}(d.f.)$



| d.f. | .25 | .1 | .05 | .025 | .01 | .005 |
|------|-------|-------|-------|--------|--------|--------|
| 1 | 1.000 | 3.078 | 6.314 | 12.706 | 31.821 | 63.657 |
| 2 | .816 | 1.886 | 2.920 | 4.303 | 6.965 | 9.925 |
| 3 | .765 | 1.638 | 2.353 | 3.182 | 4.541 | 5.841 |
| 4 | .741 | 1.533 | 2.132 | 2.776 | 3.747 | 4.604 |
| 5 | .727 | 1.476 | 2.015 | 2.571 | 3.365 | 4.032 |
| 6 | .718 | 1.440 | 1.943 | 2.447 | 3.143 | 3.707 |
| 7 | .711 | 1.415 | 1.895 | 2.365 | 2.998 | 3.499 |
| 8 | .706 | 1.397 | 1.860 | 2.306 | 2.896 | 3.355 |
| 9 | .703 | 1.383 | 1.833 | 2.262 | 2.821 | 3.250 |
| 10 | .700 | 1.372 | 1.812 | 2.228 | 2.764 | 3.169 |
| 11 | .697 | 1.363 | 1.796 | 2.201 | 2.718 | 3.106 |
| 12 | .695 | 1.356 | 1.782 | 2.179 | 2.681 | 3.055 |
| 13 | .694 | 1.350 | 1.771 | 2.160 | 2.650 | 3.012 |
| 14 | .692 | 1.345 | 1.761 | 2.145 | 2.624 | 2.977 |
| 15 | .691 | 1.341 | 1.753 | 2.131 | 2.602 | 2.947 |
| 16 | .690 | 1.337 | 1.746 | 2.120 | 2.583 | 2.921 |
| 17 | .689 | 1.333 | 1.740 | 2.110 | 2.567 | 2.898 |
| 18 | .688 | 1.330 | 1.734 | 2.101 | 2.552 | 2.878 |
| 19 | .688 | 1.328 | 1.729 | 2.093 | 2.539 | 2.861 |
| 20 | .687 | 1.325 | 1.725 | 2.086 | 2.528 | 2.845 |
| 21 | .686 | 1.323 | 1.721 | 2.080 | 2.518 | 2.831 |
| 22 | .686 | 1.321 | 1.717 | 2.074 | 2.508 | 2.819 |
| 23 | .685 | 1.319 | 1.714 | 2.069 | 2.500 | 2.807 |
| 24 | .685 | 1.318 | 1.711 | 2.064 | 2.492 | 2.797 |
| 25 | .684 | 1.316 | 1.708 | 2.060 | 2.485 | 2.787 |
| 26 | .684 | 1.315 | 1.706 | 2.056 | 2.479 | 2.779 |
| 27 | .684 | 1.314 | 1.703 | 2.052 | 2.473 | 2.771 |
| 28 | .683 | 1.313 | 1.701 | 2.048 | 2.467 | 2.763 |
| 29 | .683 | 1.311 | 1.699 | 2.045 | 2.462 | 2.756 |
| 30 | .683 | 1.310 | 1.697 | 2.042 | 2.457 | 2.750 |
| 40 | .681 | 1.303 | 1.684 | 2.021 | 2.423 | 2.704 |
| 60 | .679 | 1.296 | 1.671 | 2.000 | 2.390 | 2.660 |
| 120 | .677 | 1.289 | 1.658 | 1.980 | 2.358 | 2.617 |
| ∞ | .674 | 1.282 | 1.645 | 1.960 | 2.326 | 2.576 |

明新科技大學 98 學年度研究所招生考試 試題卷

| | | | | | |
|---------|-----|-----|-----|------------------|--------|
| 系所名稱 | 類別 | 科目 | 節次 | 准考證號碼 (考生請填入) | 考試日期 |
| 工程管理研究所 | 碩士班 | 統計學 | 第一節 | | 98/5/3 |

下午 02:10

$\alpha = 0.05$

| v_1 | v_2 | 10 | 12 | 15 | 20 | 24 | 30 | 40 | 60 | 120 | ∞ |
|----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|----------|
| 1 | 241.88 | 243.91 | 245.95 | 248.01 | 249.05 | 250.09 | 251.14 | 252.20 | 253.25 | 254.32 | |
| 2 | 19.396 | 19.413 | 19.429 | 19.446 | 19.454 | 19.462 | 19.471 | 19.479 | 19.487 | 19.496 | |
| 3 | 8.7855 | 8.7446 | 8.7029 | 8.6602 | 8.6385 | 8.6166 | 8.5944 | 8.5720 | 8.5494 | 8.5265 | |
| 4 | 5.9644 | 5.9117 | 5.8578 | 5.8025 | 5.7744 | 5.7459 | 5.7170 | 5.6878 | 5.6581 | 5.6281 | |
| 5 | 4.7351 | 4.6777 | 4.6188 | 4.5581 | 4.5272 | 4.4957 | 4.4638 | 4.4314 | 4.3984 | 4.3650 | |
| 6 | 4.0600 | 3.9999 | 3.9381 | 3.8742 | 3.8415 | 3.8082 | 3.7743 | 3.7398 | 3.7047 | 3.6688 | |
| 7 | 3.6365 | 3.5747 | 3.5108 | 3.4445 | 3.4105 | 3.3758 | 3.3404 | 3.3043 | 3.2674 | 3.2298 | |
| 8 | 3.3472 | 3.2840 | 3.2184 | 3.1503 | 3.1152 | 3.0794 | 3.0428 | 3.0053 | 2.9669 | 2.9276 | |
| 9 | 3.1373 | 3.0729 | 3.0061 | 2.9365 | 2.9005 | 2.8637 | 2.8259 | 2.7872 | 2.7475 | 2.7067 | |
| 10 | 2.9782 | 2.9130 | 2.8450 | 2.7740 | 2.7372 | 2.6996 | 2.6609 | 2.6211 | 2.5801 | 2.5379 | |
| 11 | 2.8536 | 2.7876 | 2.7186 | 2.6464 | 2.6090 | 2.5705 | 2.5309 | 2.4901 | 2.4480 | 2.4045 | |
| 12 | 2.7534 | 2.6866 | 2.6169 | 2.5436 | 2.5055 | 2.4663 | 2.4259 | 2.3842 | 2.3410 | 2.2962 | |
| 13 | 2.6710 | 2.6037 | 2.5331 | 2.4589 | 2.4202 | 2.3803 | 2.3392 | 2.2966 | 2.2524 | 2.2064 | |
| 14 | 2.6021 | 2.5342 | 2.4630 | 2.3879 | 2.3487 | 2.3082 | 2.2664 | 2.2230 | 2.1778 | 2.1307 | |
| 15 | 2.5437 | 2.4753 | 2.4035 | 2.3275 | 2.2878 | 2.2468 | 2.2043 | 2.1601 | 2.1141 | 2.0658 | |
| 16 | 2.4935 | 2.4247 | 2.3522 | 2.2756 | 2.2354 | 2.1938 | 2.1507 | 2.1058 | 2.0589 | 2.0096 | |
| 17 | 2.4499 | 2.3807 | 2.3077 | 2.2204 | 2.1898 | 2.1477 | 2.1040 | 2.0584 | 2.0107 | 1.9604 | |
| 18 | 2.4117 | 2.3421 | 2.2686 | 2.1906 | 2.1497 | 2.1071 | 2.0629 | 2.0166 | 1.9681 | 1.9168 | |
| 19 | 2.3779 | 2.3080 | 2.2341 | 2.1555 | 2.1141 | 2.0712 | 2.0264 | 1.9796 | 1.9302 | 1.8780 | |
| 20 | 2.3479 | 2.2776 | 2.2033 | 2.1242 | 2.0825 | 2.0391 | 1.9938 | 1.9464 | 1.8963 | 1.8432 | |
| 21 | 2.3210 | 2.2504 | 2.1757 | 2.0960 | 2.0540 | 2.0102 | 1.9645 | 1.9165 | 1.8657 | 1.8117 | |
| 22 | 2.2967 | 2.2258 | 2.1508 | 2.0707 | 2.0283 | 1.9842 | 1.9380 | 1.8895 | 1.8380 | 1.7831 | |
| 23 | 2.2747 | 2.2036 | 2.1282 | 2.0476 | 2.0050 | 1.9605 | 1.9139 | 1.8649 | 1.8128 | 1.7570 | |
| 24 | 2.2547 | 2.1834 | 2.1077 | 2.0267 | 1.9838 | 1.9390 | 1.8920 | 1.8424 | 1.7897 | 1.7331 | |
| 25 | 2.2365 | 2.1649 | 2.0889 | 2.0075 | 1.9643 | 1.9192 | 1.8718 | 1.8217 | 1.7684 | 1.7110 | |
| 26 | 2.2197 | 2.1479 | 2.0716 | 1.9898 | 1.9464 | 1.9010 | 1.8533 | 1.8027 | 1.7488 | 1.6906 | |
| 27 | 2.2043 | 2.1323 | 2.0553 | 1.9736 | 1.9299 | 1.8842 | 1.8361 | 1.7851 | 1.7307 | 1.6717 | |
| 28 | 2.1900 | 2.1179 | 2.0411 | 1.9586 | 1.9147 | 1.8687 | 1.8203 | 1.7689 | 1.7138 | 1.6541 | |
| 29 | 2.1768 | 2.1045 | 2.0275 | 1.9446 | 1.9005 | 1.8543 | 1.8055 | 1.7537 | 1.6981 | 1.6377 | |
| 30 | 2.1646 | 2.0921 | 2.0148 | 1.9317 | 1.8874 | 1.8409 | 1.7918 | 1.7396 | 1.6835 | 1.6223 | |
| 40 | 2.0772 | 2.0035 | 1.9245 | 1.8389 | 1.7929 | 1.7444 | 1.6928 | 1.6373 | 1.5766 | 1.5089 | |
| 60 | 1.9926 | 1.9174 | 1.8364 | 1.7480 | 1.7001 | 1.6491 | 1.5943 | 1.5343 | 1.4673 | 1.3893 | |
| 120 | 1.9105 | 1.8337 | 1.7505 | 1.6587 | 1.6084 | 1.5543 | 1.4952 | 1.4290 | 1.3519 | 1.2539 | |
| ∞ | 1.8307 | 1.7522 | 1.6664 | 1.5705 | 1.5173 | 1.4591 | 1.3940 | 1.3180 | 1.2214 | 1.0000 | |

$\alpha = 0.05$

| v_1 | v_2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---|
| 1 | 161.45 | 199.50 | 215.71 | 224.58 | 230.16 | 233.99 | 236.77 | 238.88 | 240.54 | |
| 2 | 18.513 | 19.000 | 19.164 | 19.247 | 19.296 | 19.330 | 19.353 | 19.371 | 19.385 | |
| 3 | 10.128 | 9.5521 | 9.2766 | 9.1172 | 9.0135 | 8.9406 | 8.8868 | 8.8452 | 8.8123 | |
| 4 | 7.7086 | 6.9443 | 6.5914 | 6.3883 | 6.2560 | 6.1631 | 6.0942 | 6.0410 | 5.9988 | |
| 5 | 6.6079 | 5.7861 | 5.4095 | 5.1922 | 5.0503 | 4.9503 | 4.8759 | 4.8183 | 4.7725 | |
| 6 | 5.9874 | 5.1433 | 4.7571 | 4.5337 | 4.3874 | 4.2839 | 4.2066 | 4.1468 | 4.0990 | |
| 7 | 5.5914 | 4.7374 | 4.3468 | 4.1203 | 3.9715 | 3.8660 | 3.7870 | 3.7257 | 3.6767 | |
| 8 | 5.3177 | 4.4590 | 4.0662 | 3.8378 | 3.6875 | 3.5806 | 3.5005 | 3.4381 | 3.3881 | |
| 9 | 5.1174 | 4.2565 | 3.8626 | 3.6331 | 3.4817 | 3.3738 | 3.2927 | 3.2296 | 3.1789 | |
| 10 | 4.9646 | 4.1028 | 3.7083 | 3.4780 | 3.3258 | 3.2172 | 3.1355 | 3.0717 | 3.0204 | |
| 11 | 4.8443 | 3.9823 | 3.5874 | 3.3567 | 3.2039 | 3.0946 | 3.0123 | 2.9480 | 2.8962 | |
| 12 | 4.7472 | 3.8853 | 3.4903 | 3.2592 | 3.1059 | 2.9961 | 2.9134 | 2.8486 | 2.7964 | |
| 13 | 4.6672 | 3.8056 | 3.4105 | 3.1791 | 3.0254 | 2.9153 | 2.8321 | 2.7669 | 2.7144 | |
| 14 | 4.6001 | 3.7389 | 3.3439 | 3.1122 | 2.9582 | 2.8477 | 2.7642 | 2.6987 | 2.6458 | |
| 15 | 4.5431 | 3.6823 | 3.2874 | 3.0556 | 2.9013 | 2.7905 | 2.7066 | 2.6408 | 2.5876 | |
| 16 | 4.4940 | 3.6337 | 3.2389 | 3.0069 | 2.8524 | 2.7413 | 2.6572 | 2.5911 | 2.5377 | |
| 17 | 4.4513 | 3.5915 | 3.1968 | 2.9647 | 2.8100 | 2.6987 | 2.6143 | 2.5480 | 2.4943 | |
| 18 | 4.4139 | 3.5546 | 3.1599 | 2.9277 | 2.7729 | 2.6613 | 2.5767 | 2.5102 | 2.4563 | |
| 19 | 4.3808 | 3.5219 | 3.1274 | 2.8951 | 2.7401 | 2.6283 | 2.5435 | 2.4768 | 2.4227 | |
| 20 | 4.3513 | 3.4928 | 3.0984 | 2.8661 | 2.7109 | 2.5990 | 2.5140 | 2.4471 | 2.3928 | |
| 21 | 4.3248 | 3.4668 | 3.0725 | 2.8401 | 2.6848 | 2.5727 | 2.4876 | 2.4205 | 2.3661 | |
| 22 | 4.3009 | 3.4434 | 3.0491 | 2.8167 | 2.6613 | 2.5491 | 2.4638 | 2.3965 | 2.3419 | |
| 23 | 4.2793 | 3.4221 | 3.0280 | 2.7955 | 2.6400 | 2.5277 | 2.4422 | 2.3748 | 2.3201 | |
| 24 | 4.2597 | 3.4028 | 3.0088 | 2.7763 | 2.6207 | 2.5082 | 2.4226 | 2.3551 | 2.3002 | |
| 25 | 4.2417 | 3.3852 | 2.9912 | 2.7587 | 2.6030 | 2.4904 | 2.4047 | 2.3371 | 2.2821 | |
| 26 | 4.2252 | 3.3690 | 2.9751 | 2.7426 | 2.5868 | 2.4741 | 2.3883 | 2.3205 | 2.2655 | |
| 27 | 4.2100 | 3.3541 | 2.9604 | 2.7278 | 2.5719 | 2.4591 | 2.3732 | 2.3053 | 2.2501 | |
| 28 | 4.1960 | 3.3404 | 2.9467 | 2.7141 | 2.5581 | 2.4453 | 2.3593 | 2.2913 | 2.2360 | |
| 29 | 4.1830 | 3.3277 | 2.9340 | 2.7014 | 2.5454 | 2.4324 | 2.3463 | 2.2782 | 2.2229 | |
| 30 | 4.1709 | 3.3158 | 2.9223 | 2.6896 | 2.5336 | 2.4205 | 2.3343 | 2.2662 | 2.2107 | |
| 40 | 4.0848 | 3.2317 | 2.8387 | 2.6060 | 2.4495 | 2.3359 | 2.2490 | 2.1802 | 2.1240 | |
| 60 | 4.0012 | 3.1504 | 2.7581 | 2.5252 | 2.3683 | 2.2540 | 2.1665 | 2.0970 | 2.0401 | |
| 120 | 3.9201 | 3.0718 | 2.6802 | 2.4472 | 2.2900 | 2.1750 | 2.0867 | 2.0164 | 1.9588 | |
| ∞ | 3.8415 | 2.9957 | 2.6049 | 2.3719 | 2.2141 | 2.0986 | 2.0096 | 1.9384 | 1.8800 | |