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|----|-------|------|-------------|----|----|
| 系級 | 科目 | 授課教師 | 考試日期 | 學號 | 姓名 |
| 護三 | 生物統計學 | 陳怡權 | 93年1月15日第 節 | | |

請注意本試題共 5 張。如發現頁數不足及空白頁或缺印，應當場請求補齊，否則缺少部份概以零分計。
 每張試題卷務必填寫(學號)、(姓名)。

- 請注意：(1) 請依順序詳列所有計算題的算式，否則不與計分。
 (2) 以下算式中的每一步驟若無法整除時，請以四捨五入算至小數點後第一位，再帶入下一步驟或查表求值，否則不與計分。
 (3) 若擬查表的值超過小數點後三位數，請四捨五入至第二位後，再查表。
 (4) 最後答案請以斜線標明清楚。

- 若 x 為常態分配，其 $\mu=100, \sigma=5$ ，求 (共 8 分)
 - $P(x \leq 92)$
 - $P(102 \leq x \leq 108)$
- 設某甘藷田炭疽菌之發生率為 10%，今隨機抽查 300 塊甘藷，試求有 20 至 30 塊罹患炭疽菌之機率。(共 10 分)
- 假設某年齡組的人口其舒張血至平均為 80mmHg，標準差為 8mmHg，由此組的人口中隨機抽取 49 人為樣本，求：
 - 樣本平均數大於 83mmHg 之機率有多少？(5 分)
 - 該年齡組人口舒張至大於 83mmHg 之比例為多少？(10 分)
- 健康成年人標準紅血球素含量為 16g/100ml，標準差 $\sigma=2g$ ，從事某行業的 25 人，其紅血球素平均值為 16.0g。(共 10 分)
 - 求 μ 之 95% 信賴區間並解釋之。
 - 當樣本數增加時，信賴區間會縮窄或是增寬？請解釋。
- 設下列資料為安眠藥對性別之試驗結果記錄

男： $n_1=16, \bar{x}_1=8.75, S_1^2=9$
 女： $n_2=10, \bar{x}_2=7.25, S_2^2=4$

 - 請問虛無假設與對立假設為何？(2 分)
 - 若男女兩族群變異數相同，在 $\alpha=0.05$ 下，請測驗男女藥效是否有差別？(5 分)
 - 求兩族群平均數差之 95% 信賴區間，並解釋其意義。(共 5 分)

6. 完成下面的變異數分析表

| 來源 | 平方和 | 自由度 | 均方 | F 檢定 |
|----|-----|-----|----|------|
| 組間 | 360 | b | c | e |
| 組內 | 450 | 15 | d | |
| 總和 | a | 19 | | |

- 請計算表格內 a, b, c, d, e 之值。(共 10 分)
- 以 $\alpha=0.05$ ，F 檢定有沒有達到統計顯著意義？(5 分)

| | | | | | |
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7. 美國心臟學會提供下面公式，以身高 (x) 來預測體重 (y)。女性： $y=100+4.0x$ ，男性： $y=110+5.0x$ ，x 單位為呎，y 單位為磅。若小雲 (女) 的身高為 5.6 呎，體重為 150 磅。
- (1) 以上述公式估計，小雲的理想體重為何？(5分)
 - (2) 與實際體重作比較，殘差分別為何？(5分)
 - (3) 你對此結果的解釋與推論為何？(5分)
8. 飲酒習慣與初經年齡的關係如下，請以 $\alpha=0.05$ 檢定兩變項是否獨立。(15分)

| 初經年齡 | 蛋攝取量 | |
|------|------|--------|
| | 不攝取 | 每週1次以上 |
| 較早 | 10 | 20 |
| 中間 | 8 | 30 |
| 較晚 | 15 | 35 |

公式：

1.
$$Z = \frac{x - \mu}{\sigma}$$

2.
$$Z = \frac{x - \mu}{\sigma/\sqrt{n}}$$

3.
$$t = \frac{\bar{x} - \mu}{S/\sqrt{n}}$$

4.
$$P_r(-Z_{1-\alpha/2} \leq \frac{\bar{x} - \mu}{\sigma_x} \leq Z_{1-\alpha/2}) = 1 - \alpha$$

5. $\mu_1 - \mu_2$ 之 $(1-\alpha)100\%CI = \bar{x}_1 - \bar{x}_2 \pm t(S_p \sqrt{\frac{1}{n_1} + \frac{1}{n_2}})$

6. $(\bar{x}_1 - \bar{x}_2) - t_{\alpha/2, \nu} \sqrt{\frac{SSD}{n(n-1)}} \leq \mu_1 - \mu_2 \leq (\bar{x}_1 - \bar{x}_2) + t_{\alpha/2, \nu} \sqrt{\frac{SSD}{n(n-1)}}$

7.
$$Z = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$$

8.
$$Z = \frac{(\bar{X}_1 - \bar{X}_2) - (\mu_1 - \mu_2)}{S_{\bar{x}_1 - \bar{x}_2}}$$

 式中 $S_{\bar{x}_1 - \bar{x}_2} = \sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}$

9.
$$Z = \frac{(\bar{X}_1 - \bar{X}_2) - (\mu_1 - \mu_2)}{S_{\bar{x}_1 - \bar{x}_2}}$$

10.
$$S_p^2 = \frac{S_1^2(n_1 - 1) + S_2^2(n_2 - 1)}{n_1 + n_2 - 2}$$

式中 $S_{\bar{x}_1 - \bar{x}_2} = S_p \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}$

$$t = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{S_p \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

11.
$$t = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{S_{\bar{x}_1 - \bar{x}_2}^2}}$$

$$= \frac{\bar{D} - 0}{\sqrt{\frac{\sum D_i^2 - (\sum D_i)^2/n}{n(n-1)}}}$$

12.
$$\chi^2_{(k-1)} = \sum_{i=1}^k (O_i - E_i)^2 / E_i$$

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13.
$$\chi^2_c = \sum \frac{(|O_i - E_i| - 0.5)^2}{E_i}$$

14.
$$r = \frac{\sum xy - \frac{(\sum x)(\sum y)}{n}}{\sqrt{[\sum x^2 - \frac{(\sum x)^2}{n}][\sum y^2 - \frac{(\sum y)^2}{n}]}}$$

15.
$$t = \frac{r - 0}{\sqrt{(1-r^2)/(n-2)}}$$

16.
$$SS_t = \sum_{i=1}^k \sum_{j=1}^{n_i} x_{ij}^2 - \frac{[\sum_{i=1}^k \sum_{j=1}^{n_i} x_{ij}]^2}{\sum_{i=1}^k n_i}$$

17.
$$SS_b = \sum_{i=1}^k n_i \bar{x}_i^2 - \frac{[\sum_{i=1}^k \sum_{j=1}^{n_i} x_{ij}]^2}{\sum_{i=1}^k n_i}$$

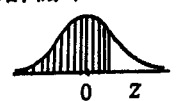
18.
$$\hat{\beta}_1 = b = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sum (x - \bar{x})^2} = r_{xy} \frac{S_y}{S_x}$$

$$\hat{\beta}_0 = a = \bar{y} - b\bar{x}$$

查表

附表 4 標準常態分布累計機率

$F_z(z) = P_r(Z \leq z)$



| 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 | .0003 |
| -3.3 | .0005 | .0005 | .0005 | .0004 | .0004 | .0004 | .0004 | .0004 | .0004 | .0003 |
| -3.2 | .0007 | .0007 | .0006 | .0006 | .0006 | .0006 | .0006 | .0005 | .0005 | .0005 |
| -3.1 | .0010 | .0009 | .0009 | .0009 | .0008 | .0008 | .0008 | .0008 | .0007 | .0007 |
| -3.0 | .0013 | .0013 | .0013 | .0012 | .0012 | .0011 | .0011 | .0011 | .0010 | .0010 |
| -2.9 | .0019 | .0018 | .0018 | .0017 | .0016 | .0016 | .0015 | .0015 | .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 | .2005 | .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 |

附表 4 (續)

| z | .00 | .01 | .02 | .03 | .04 | .05 | .06 | .07 | .08 | .09 |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0.0 | .5000 | .5040 | .5080 | .5120 | .5160 | .5199 | .5239 | .5279 | .5319 | .5359 |
| 0.1 | .5398 | .5438 | .5478 | .5517 | .5557 | .5596 | .5636 | .5675 | .5714 | .5753 |
| 0.2 | .5793 | .5832 | .5871 | .5910 | .5948 | .5987 | .6026 | .6064 | .6103 | .6141 |
| 0.3 | .6179 | .6217 | .6255 | .6293 | .6331 | .6368 | .6406 | .6443 | .6480 | .6517 |
| 0.4 | .6554 | .6591 | .6628 | .6664 | .6700 | .6736 | .6772 | .6808 | .6844 | .6879 |
| 0.5 | .6915 | .6950 | .6985 | .7019 | .7054 | .7088 | .7123 | .7157 | .7190 | .7224 |
| 0.6 | .7257 | .7291 | .7324 | .7357 | .7389 | .7422 | .7454 | .7486 | .7517 | .7549 |
| 0.7 | .7580 | .7611 | .7642 | .7673 | .7703 | .7734 | .7764 | .7794 | .7823 | .7852 |
| 0.8 | .7881 | .7910 | .7939 | .7967 | .7995 | .8023 | .8051 | .8078 | .8106 | .8133 |
| 0.9 | .8159 | .8186 | .8212 | .8238 | .8264 | .8289 | .8315 | .8340 | .8365 | .8389 |
| 1.0 | .8413 | .8438 | .8461 | .8485 | .8508 | .8531 | .8554 | .8577 | .8599 | .8621 |
| 1.1 | .8643 | .8665 | .8686 | .8708 | .8729 | .8749 | .8770 | .8790 | .8810 | .8830 |
| 1.2 | .8849 | .8869 | .8888 | .8907 | .8925 | .8944 | .8962 | .8980 | .8997 | .9015 |
| 1.3 | .9032 | .9049 | .9066 | .9082 | .9099 | .9115 | .9131 | .9147 | .9162 | .9177 |
| 1.4 | .9192 | .9207 | .9222 | .9236 | .9251 | .9265 | .9279 | .9292 | .9306 | .9319 |
| 1.5 | .9332 | .9345 | .9357 | .9370 | .9382 | .9394 | .9406 | .9418 | .9429 | .9441 |
| 1.6 | .9452 | .9463 | .9474 | .9484 | .9495 | .9505 | .9515 | .9525 | .9535 | .9545 |
| 1.7 | .9554 | .9564 | .9573 | .9582 | .9591 | .9599 | .9608 | .9616 | .9625 | .9633 |
| 1.8 | .9641 | .9649 | .9656 | .9664 | .9671 | .9678 | .9686 | .9693 | .9699 | .9706 |
| 1.9 | .9713 | .9719 | .9726 | .9732 | .9738 | .9744 | .9750 | .9756 | .9761 | .9767 |
| 2.0 | .9772 | .9778 | .9783 | .9788 | .9793 | .9798 | .9803 | .9808 | .9812 | .9817 |
| 2.1 | .9821 | .9826 | .9830 | .9834 | .9838 | .9842 | .9846 | .9850 | .9854 | .9857 |
| 2.2 | .9861 | .9864 | .9868 | .9871 | .9875 | .9878 | .9881 | .9884 | .9887 | .9890 |
| 2.3 | .9893 | .9896 | .9898 | .9901 | .9904 | .9906 | .9909 | .9911 | .9913 | .9916 |
| 2.4 | .9918 | .9920 | .9922 | .9925 | .9927 | .9929 | .9931 | .9932 | .9934 | .9936 |
| 2.5 | .9938 | .9940 | .9941 | .9943 | .9945 | .9946 | .9948 | .9949 | .9951 | .9952 |
| 2.6 | .9953 | .9955 | .9956 | .9957 | .9959 | .9960 | .9961 | .9962 | .9963 | .9964 |
| 2.7 | .9965 | .9966 | .9967 | .9968 | .9969 | .9970 | .9971 | .9972 | .9973 | .9974 |
| 2.8 | .9974 | .9975 | .9976 | .9977 | .9977 | .9978 | .9979 | .9979 | .9980 | .9981 |
| 2.9 | .9981 | .9982 | .9982 | .9983 | .9984 | .9984 | .9985 | .9985 | .9986 | .9986 |
| 3.0 | .9987 | .9987 | .9987 | .9988 | .9988 | .9989 | .9989 | .9989 | .9990 | .9990 |
| 3.1 | .9990 | .9991 | .9991 | .9991 | .9992 | .9992 | .9992 | .9992 | .9993 | .9993 |
| 3.2 | .9993 | .9993 | .9994 | .9994 | .9994 | .9994 | .9994 | .9995 | .9995 | .9995 |
| 3.3 | .9995 | .9995 | .9995 | .9996 | .9996 | .9996 | .9996 | .9996 | .9996 | .9997 |
| 3.4 | .9997 | .9997 | .9997 | .9997 | .9997 | .9997 | .9997 | .9997 | .9997 | .9998 |
| 3.5 | .9998 | .9998 | .9998 | .9998 | .9998 | .9998 | .9998 | .9998 | .9998 | .9998 |

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附表5 學生氏t分布(右單尾)

$F(t) = P_r(T \geq t)$



| 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 | 4.684 |
| 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 |

附表5 (續)



| d.f. | .0025 | .001 | .0005 | .00025 | .0001 | .00005 | .000025 | .00001 |
|------|---------|---------|---------|-----------|-----------|-----------|------------|------------|
| 1 | 127.321 | 318.309 | 636.619 | 1,273.239 | 3,183.099 | 6,366.198 | 12,732.395 | 31,830.989 |
| 2 | 14.089 | 22.327 | 31.598 | 44.705 | 70.700 | 99.992 | 141.416 | 233.603 |
| 3 | 7.453 | 10.214 | 12.924 | 16.326 | 22.204 | 28.000 | 35.298 | 47.928 |
| 4 | 5.998 | 7.173 | 8.610 | 10.306 | 13.034 | 15.544 | 18.522 | 23.332 |
| 5 | 4.773 | 5.893 | 6.869 | 7.976 | 9.678 | 11.178 | 12.893 | 15.547 |
| 6 | 4.317 | 5.208 | 5.959 | 6.788 | 8.025 | 9.082 | 10.261 | 12.032 |
| 7 | 4.029 | 4.785 | 5.408 | 6.082 | 7.063 | 7.885 | 8.782 | 10.103 |
| 8 | 3.833 | 4.501 | 5.041 | 5.618 | 6.442 | 7.120 | 7.851 | 8.907 |
| 9 | 3.690 | 4.297 | 4.781 | 5.291 | 6.010 | 6.594 | 7.215 | 8.102 |
| 10 | 3.581 | 4.144 | 4.587 | 5.049 | 5.694 | 6.211 | 6.757 | 7.527 |
| 11 | 3.497 | 4.025 | 4.437 | 4.863 | 5.453 | 5.921 | 6.412 | 7.098 |
| 12 | 3.428 | 3.930 | 4.318 | 4.716 | 5.263 | 5.694 | 6.143 | 6.756 |
| 13 | 3.372 | 3.852 | 4.221 | 4.597 | 5.111 | 5.513 | 5.928 | 6.501 |
| 14 | 3.326 | 3.787 | 4.140 | 4.499 | 4.985 | 5.363 | 5.753 | 6.287 |
| 15 | 3.286 | 3.733 | 4.073 | 4.417 | 4.880 | 5.239 | 5.607 | 6.109 |
| 16 | 3.252 | 3.686 | 4.015 | 4.346 | 4.791 | 5.134 | 5.484 | 5.960 |
| 17 | 3.223 | 3.646 | 3.965 | 4.286 | 4.714 | 5.044 | 5.379 | 5.822 |
| 18 | 3.197 | 3.610 | 3.922 | 4.233 | 4.648 | 4.966 | 5.288 | 5.677 |
| 19 | 3.174 | 3.579 | 3.883 | 4.187 | 4.590 | 4.897 | 5.209 | 5.543 |
| 20 | 3.153 | 3.552 | 3.850 | 4.146 | 4.539 | 4.837 | 5.139 | 5.469 |
| 21 | 3.135 | 3.527 | 3.819 | 4.110 | 4.493 | 4.784 | 5.077 | 5.402 |
| 22 | 3.119 | 3.505 | 3.792 | 4.077 | 4.452 | 4.736 | 5.022 | 5.343 |
| 23 | 3.104 | 3.485 | 3.768 | 4.048 | 4.415 | 4.693 | 4.972 | 5.290 |
| 24 | 3.090 | 3.467 | 3.745 | 4.021 | 4.382 | 4.654 | 4.927 | 5.241 |
| 25 | 3.078 | 3.450 | 3.725 | 3.997 | 4.352 | 4.619 | 4.887 | 5.197 |
| 26 | 3.067 | 3.435 | 3.707 | 3.974 | 4.324 | 4.587 | 4.850 | 5.157 |
| 27 | 3.057 | 3.421 | 3.690 | 3.954 | 4.299 | 4.558 | 4.816 | 5.120 |
| 28 | 3.047 | 3.408 | 3.674 | 3.935 | 4.275 | 4.530 | 4.784 | 5.086 |
| 29 | 3.038 | 3.396 | 3.659 | 3.918 | 4.254 | 4.506 | 4.756 | 5.054 |
| 30 | 3.030 | 3.385 | 3.646 | 3.902 | 4.234 | 4.482 | 4.729 | 5.024 |
| 40 | 2.996 | 3.340 | 3.591 | 3.836 | 4.153 | 4.389 | 4.622 | 4.927 |
| 50 | 2.971 | 3.307 | 3.551 | 3.788 | 4.094 | 4.321 | 4.544 | 4.835 |
| 60 | 2.952 | 3.281 | 3.520 | 3.752 | 4.049 | 4.269 | 4.485 | 4.766 |
| 70 | 2.937 | 3.261 | 3.496 | 3.723 | 4.014 | 4.228 | 4.438 | 4.711 |
| 80 | 2.925 | 3.245 | 3.476 | 3.700 | 3.986 | 4.196 | 4.401 | 4.667 |
| 90 | 2.915 | 3.232 | 3.460 | 3.681 | 3.962 | 4.169 | 4.370 | 4.631 |
| 100 | 2.899 | 3.211 | 3.435 | 3.651 | 3.926 | 4.127 | 4.323 | 4.576 |
| 120 | 2.887 | 3.195 | 3.416 | 3.629 | 3.899 | 4.096 | 4.288 | 4.535 |
| 140 | 2.878 | 3.183 | 3.402 | 3.612 | 3.878 | 4.072 | 4.261 | 4.503 |
| 160 | 2.871 | 3.174 | 3.390 | 3.598 | 3.862 | 4.053 | 4.240 | 4.478 |
| ∞ | 2.807 | 3.090 | 3.291 | 3.481 | 3.719 | 3.891 | 4.056 | 4.265 |

附表6 卡方

$F(x^2) = P_r(\chi^2 \geq x^2)$



| d.f. | .995 | .990 | .975 | .950 | .900 | .800 | .700 | .600 | .500 |
|------|-----------------------------|---------------------------|---------------------------|---------------------------|---------|---------|---------|---------|---------|
| 1 | 392.704 × 10 ⁻¹⁰ | 137088 × 10 ⁻⁹ | 982069 × 10 ⁻⁸ | 393214 × 10 ⁻⁷ | 3.84146 | 5.02389 | 6.63490 | 7.87944 | 8.89720 |
| 2 | .0100251 | .0201007 | .0506356 | .102587 | 3.59147 | 7.37776 | 9.21034 | 10.5966 | 11.5913 |
| 3 | .0717212 | .141832 | .217995 | .351846 | 7.81473 | 9.34840 | 11.3449 | 12.8381 | 13.8883 |
| 4 | .206990 | .297110 | .484419 | .710721 | 9.48773 | 11.1433 | 13.2767 | 14.8602 | 15.9852 |
| 5 | .411740 | .554300 | .831211 | 1.145476 | 11.0705 | 12.8325 | 15.0863 | 16.7496 | 17.9228 |
| 6 | .675272 | .872085 | 1.237347 | 1.63539 | 12.5916 | 14.4494 | 16.8119 | 18.5476 | 19.6756 |
| 7 | .989265 | 1.239043 | 1.68987 | 2.16735 | 14.0671 | 16.0128 | 18.4753 | 20.2777 | 21.7822 |
| 8 | 1.344419 | 1.646482 | 2.17973 | 2.73264 | 15.5073 | 17.5346 | 20.0902 | 21.9550 | 23.5418 |
| 9 | 1.734926 | 2.087912 | 2.70039 | 3.32511 | 16.9190 | 19.0228 | 21.6660 | 23.5893 | 25.1882 |
| 10 | 2.15585 | 2.55821 | 3.24697 | 3.94030 | 18.3070 | 20.4831 | 23.2093 | 25.1882 | 26.7569 |
| 11 | 2.60321 | 3.05347 | 3.81575 | 4.57481 | 19.6751 | 21.9200 | 24.7250 | 26.7569 | 28.3045 |
| 12 | 3.07382 | 3.57056 | 4.40379 | 5.22603 | 21.0261 | 23.3367 | 26.2170 | 28.2995 | 29.9007 |
| 13 | 3.56503 | 4.10691 | 5.00874 | 5.89186 | 22.3621 | 24.7536 | 27.6883 | 29.8194 | 31.5264 |
| 14 | 4.07468 | 4.66043 | 5.62872 | 6.57683 | 23.6848 | 26.1190 | 29.1413 | 31.3193 | 33.1541 |
| 15 | 4.60094 | 5.22935 | 6.28214 | 7.26994 | 24.9958 | 27.4884 | 30.5779 | 32.8013 | 34.7857 |
| 16 | 5.14224 | 5.81221 | 6.96764 | 7.96164 | 26.2962 | 28.8454 | 31.9999 | 34.2672 | 36.4215 |
| 17 | 5.69724 | 6.40776 | 7.56418 | 8.67176 | 27.5871 | 30.1910 | 33.4087 | 35.7185 | 38.0622 |
| 18 | 6.26481 | 7.01491 | 8.23075 | 9.39046 | 28.8693 | 31.5264 | 34.8053 | 37.1564 | 39.7077 |
| 19 | 6.84398 | 7.63273 | 8.90635 | 10.1170 | 30.1435 | 32.8523 | 36.1908 | 38.5822 | 41.3572 |
| 20 | 7.43255 | 8.26100 | 9.59091 | 10.8508 | 31.4104 | 34.1696 | 37.5662 | 39.9968 | 43.0104 |

| 系級 | 科目 | 授課教師 | 考試日期 | 學號 | 姓名 |
|----|-------|------|-------------|----|----|
| 護三 | 生物統計學 | 陳怡樺 | 93年1月15日第 節 | | |

請注意本試題共 5 張。如發現頁數不足及空白頁或缺印，應當場請求補齊，否則缺少部份概以零分計。
 •每張試題卷務必填寫(學號)、(姓名)。

F 分佈表

$F_{\alpha}(\alpha = .05)$

| df(m) | df(n) | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 1 | 161.4 | 199.5 | 215.7 | 224.6 | 230.2 | 234.0 | 236.8 | 238.9 | 240.5 |
| 2 | 18.51 | 19.00 | 19.16 | 19.25 | 19.30 | 19.33 | 19.35 | 19.37 | 19.38 |
| 3 | 10.13 | 9.85 | 9.78 | 9.72 | 9.67 | 9.64 | 9.62 | 9.61 | 9.61 |
| 4 | 7.71 | 6.94 | 6.59 | 6.39 | 6.26 | 6.16 | 6.09 | 6.04 | 6.01 |
| 5 | 6.61 | 5.79 | 5.41 | 5.19 | 5.05 | 4.95 | 4.88 | 4.82 | 4.77 |
| 6 | 5.99 | 5.14 | 4.76 | 4.53 | 4.39 | 4.28 | 4.21 | 4.15 | 4.10 |
| 7 | 5.59 | 4.74 | 4.35 | 4.12 | 3.97 | 3.87 | 3.79 | 3.73 | 3.68 |
| 8 | 5.32 | 4.46 | 4.07 | 3.84 | 3.69 | 3.59 | 3.50 | 3.44 | 3.39 |
| 9 | 5.12 | 4.26 | 3.86 | 3.63 | 3.48 | 3.37 | 3.29 | 3.23 | 3.18 |
| 10 | 4.96 | 4.10 | 3.71 | 3.48 | 3.33 | 3.22 | 3.14 | 3.07 | 3.02 |
| 11 | 4.84 | 3.98 | 3.59 | 3.36 | 3.20 | 3.09 | 3.01 | 2.95 | 2.90 |
| 12 | 4.75 | 3.89 | 3.49 | 3.26 | 3.11 | 3.00 | 2.91 | 2.85 | 2.80 |
| 13 | 4.67 | 3.81 | 3.41 | 3.18 | 3.03 | 2.92 | 2.83 | 2.77 | 2.71 |
| 14 | 4.60 | 3.74 | 3.34 | 3.11 | 2.96 | 2.85 | 2.76 | 2.70 | 2.65 |
| 15 | 4.54 | 3.68 | 3.29 | 3.06 | 2.90 | 2.79 | 2.71 | 2.64 | 2.59 |
| 16 | 4.49 | 3.63 | 3.24 | 3.01 | 2.85 | 2.74 | 2.66 | 2.59 | 2.54 |
| 17 | 4.45 | 3.59 | 3.20 | 2.96 | 2.81 | 2.70 | 2.61 | 2.55 | 2.50 |
| 18 | 4.41 | 3.55 | 3.16 | 2.93 | 2.77 | 2.66 | 2.58 | 2.51 | 2.46 |
| 19 | 4.38 | 3.52 | 3.13 | 2.90 | 2.74 | 2.63 | 2.54 | 2.48 | 2.42 |
| 20 | 4.35 | 3.49 | 3.10 | 2.87 | 2.71 | 2.60 | 2.51 | 2.45 | 2.39 |
| 21 | 4.32 | 3.47 | 3.07 | 2.84 | 2.68 | 2.57 | 2.49 | 2.42 | 2.37 |
| 22 | 4.30 | 3.44 | 3.05 | 2.82 | 2.66 | 2.55 | 2.46 | 2.40 | 2.34 |
| 23 | 4.28 | 3.42 | 3.03 | 2.80 | 2.64 | 2.53 | 2.44 | 2.37 | 2.32 |
| 24 | 4.26 | 3.40 | 3.01 | 2.78 | 2.62 | 2.51 | 2.42 | 2.36 | 2.30 |
| 25 | 4.24 | 3.39 | 2.99 | 2.76 | 2.60 | 2.49 | 2.40 | 2.34 | 2.28 |
| 26 | 4.23 | 3.37 | 2.98 | 2.74 | 2.59 | 2.47 | 2.39 | 2.32 | 2.27 |
| 27 | 4.21 | 3.35 | 2.96 | 2.73 | 2.57 | 2.45 | 2.37 | 2.31 | 2.25 |
| 28 | 4.20 | 3.34 | 2.95 | 2.71 | 2.56 | 2.44 | 2.35 | 2.29 | 2.24 |
| 29 | 4.18 | 3.33 | 2.93 | 2.70 | 2.55 | 2.43 | 2.34 | 2.28 | 2.22 |
| 30 | 4.17 | 3.32 | 2.92 | 2.69 | 2.53 | 2.42 | 2.33 | 2.27 | 2.21 |
| 40 | 4.08 | 3.23 | 2.84 | 2.61 | 2.45 | 2.34 | 2.25 | 2.18 | 2.12 |
| 60 | 4.00 | 3.15 | 2.76 | 2.53 | 2.37 | 2.25 | 2.17 | 2.10 | 2.04 |
| 80 | 3.92 | 3.07 | 2.68 | 2.45 | 2.29 | 2.17 | 2.09 | 2.02 | 1.96 |
| 120 | 3.84 | 3.00 | 2.60 | 2.37 | 2.21 | 2.10 | 2.01 | 1.94 | 1.88 |

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$F_{\alpha}(\alpha = .05)$

| df(m) | df(n) | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--|--|
| | 10 | 12 | 15 | 20 | 24 | 30 | 40 | 60 | 120 | ∞ | | |
| 1 | 241.9 | 243.9 | 245.9 | 248.0 | 249.1 | 250.1 | 251.1 | 252.2 | 253.3 | 254.30 | | |
| 2 | 19.40 | 19.41 | 19.43 | 19.45 | 19.45 | 19.46 | 19.47 | 19.48 | 19.49 | 19.50 | | |
| 3 | 14.86 | 14.87 | 14.88 | 14.89 | 14.90 | 14.91 | 14.92 | 14.93 | 14.94 | 14.95 | | |
| 4 | 12.59 | 12.60 | 12.61 | 12.62 | 12.63 | 12.64 | 12.65 | 12.66 | 12.67 | 12.68 | | |
| 5 | 11.15 | 11.16 | 11.17 | 11.18 | 11.19 | 11.20 | 11.21 | 11.22 | 11.23 | 11.24 | | |
| 6 | 10.13 | 10.14 | 10.15 | 10.16 | 10.17 | 10.18 | 10.19 | 10.20 | 10.21 | 10.22 | | |
| 7 | 9.35 | 9.36 | 9.37 | 9.38 | 9.39 | 9.40 | 9.41 | 9.42 | 9.43 | 9.44 | | |
| 8 | 8.79 | 8.80 | 8.81 | 8.82 | 8.83 | 8.84 | 8.85 | 8.86 | 8.87 | 8.88 | | |
| 9 | 8.34 | 8.35 | 8.36 | 8.37 | 8.38 | 8.39 | 8.40 | 8.41 | 8.42 | 8.43 | | |
| 10 | 7.96 | 7.97 | 7.98 | 7.99 | 8.00 | 8.01 | 8.02 | 8.03 | 8.04 | 8.05 | | |
| 11 | 7.64 | 7.65 | 7.66 | 7.67 | 7.68 | 7.69 | 7.70 | 7.71 | 7.72 | 7.73 | | |
| 12 | 7.36 | 7.37 | 7.38 | 7.39 | 7.40 | 7.41 | 7.42 | 7.43 | 7.44 | 7.45 | | |
| 13 | 7.11 | 7.12 | 7.13 | 7.14 | 7.15 | 7.16 | 7.17 | 7.18 | 7.19 | 7.20 | | |
| 14 | 6.89 | 6.90 | 6.91 | 6.92 | 6.93 | 6.94 | 6.95 | 6.96 | 6.97 | 6.98 | | |
| 15 | 6.70 | 6.71 | 6.72 | 6.73 | 6.74 | 6.75 | 6.76 | 6.77 | 6.78 | 6.79 | | |
| 16 | 6.54 | 6.55 | 6.56 | 6.57 | 6.58 | 6.59 | 6.60 | 6.61 | 6.62 | 6.63 | | |
| 17 | 6.40 | 6.41 | 6.42 | 6.43 | 6.44 | 6.45 | 6.46 | 6.47 | 6.48 | 6.49 | | |
| 18 | 6.28 | 6.29 | 6.30 | 6.31 | 6.32 | 6.33 | 6.34 | 6.35 | 6.36 | 6.37 | | |
| 19 | 6.17 | 6.18 | 6.19 | 6.20 | 6.21 | 6.22 | 6.23 | 6.24 | 6.25 | 6.26 | | |
| 20 | 6.08 | 6.09 | 6.10 | 6.11 | 6.12 | 6.13 | 6.14 | 6.15 | 6.16 | 6.17 | | |
| 21 | 6.00 | 6.01 | 6.02 | 6.03 | 6.04 | 6.05 | 6.06 | 6.07 | 6.08 | 6.09 | | |
| 22 | 5.93 | 5.94 | 5.95 | 5.96 | 5.97 | 5.98 | 5.99 | 6.00 | 6.01 | 6.02 | | |
| 23 | 5.87 | 5.88 | 5.89 | 5.90 | 5.91 | 5.92 | 5.93 | 5.94 | 5.95 | 5.96 | | |
| 24 | 5.82 | 5.83 | 5.84 | 5.85 | 5.86 | 5.87 | 5.88 | 5.89 | 5.90 | 5.91 | | |
| 25 | 5.77 | 5.78 | 5.79 | 5.80 | 5.81 | 5.82 | 5.83 | 5.84 | 5.85 | 5.86 | | |
| 26 | 5.73 | 5.74 | 5.75 | 5.76 | 5.77 | 5.78 | 5.79 | 5.80 | 5.81 | 5.82 | | |
| 27 | 5.69 | 5.70 | 5.71 | 5.72 | 5.73 | 5.74 | 5.75 | 5.76 | 5.77 | 5.78 | | |
| 28 | 5.65 | 5.66 | 5.67 | 5.68 | 5.69 | 5.70 | 5.71 | 5.72 | 5.73 | 5.74 | | |
| 29 | 5.62 | 5.63 | 5.64 | 5.65 | 5.66 | 5.67 | 5.68 | 5.69 | 5.70 | 5.71 | | |
| 30 | 5.59 | 5.60 | 5.61 | 5.62 | 5.63 | 5.64 | 5.65 | 5.66 | 5.67 | 5.68 | | |
| 40 | 5.48 | 5.49 | 5.50 | 5.51 | 5.52 | 5.53 | 5.54 | 5.55 | 5.56 | 5.57 | | |
| 60 | 5.38 | 5.39 | 5.40 | 5.41 | 5.42 | 5.43 | 5.44 | 5.45 | 5.46 | 5.47 | | |
| 120 | 5.28 | 5.29 | 5.30 | 5.31 | 5.32 | 5.33 | 5.34 | 5.35 | 5.36 | 5.37 | | |