

113年公務人員特種考試警察人員、一般警察人員、  
國家安全局國家安全情報人員及移民行政人員考試試題

代號：50770  
頁次：5-1

考試別：警察人員考試

等別：三等考試

類科組別：交通警察人員交通組

科目：交通統計與分析

考試時間：2小時

座號：\_\_\_\_\_

※注意：(一)可以使用電子計算器。

(二)不必抄題，作答時請將試題題號及答案依照順序寫在試卷上，於本試題上作答者，不予計分。

(三)本科目除專門名詞或數理公式外，應使用本國文字作答。

一、回答下列諸問題：

(一)在統計估計與檢定分析時，參數 (Parameters) 與統計量 (Statistics) 所指為何？請說明其差異。(8分)

(二)進行假設檢定時，何謂  $\alpha$  錯誤 (又稱 Type I error)？與常用之  $p$  值有何關係？(8分)

(三)統計分析中所指之自由度 (Degree of Freedom) 為何？如何計算？(8分)

(四)何謂單尾檢定 (One-Tailed Test) 與雙尾檢定 (Two-Tailed Test)？在  $\alpha$  值確定下 (例如  $\alpha = 0.05$ )，其檢定門檻各該如何決定？(8分)

二、某媒體對 100 位未滿 18 歲之高中學生調查「是否有無照駕駛機車之經驗」，發現其中 30 位受訪者已有「無照駕駛機車之經驗」。請問在 10% 之顯著水準下，如何檢定「高中生無照駕駛機車率是否大於 20%」？

(一)請問其「虛無假設  $H_0$ 」與「對立假設  $H_1$ 」各為何？(3分)

(二)請問該如何進行此虛無假設之檢定？其檢定統計量為何？(10分)

(三)在 10% 之「顯著水準」要求下，檢定結果之結論為何？(5分)

三、一項對現有道路交通安全滿意度之隨機調查結果如下表所示，試問在  $\alpha = 0.05$  之顯著水準下，性別與滿意程度是否獨立？

|    | 非常滿意 | 普通 | 非常不滿意 | 小計  |
|----|------|----|-------|-----|
| 男性 | 50   | 16 | 31    | 97  |
| 女性 | 61   | 26 | 16    | 103 |
| 小計 | 111  | 42 | 47    | 200 |

(一)請問其「虛無假設  $H_0$ 」與「對立假設  $H_1$ 」各為何？(5分)

(二)請問該如何進行此虛無假設之檢定？其檢定統計量為何？(15分)

(三)在 5% 之「顯著水準」要求下，檢定結果之結論為何？(5分)

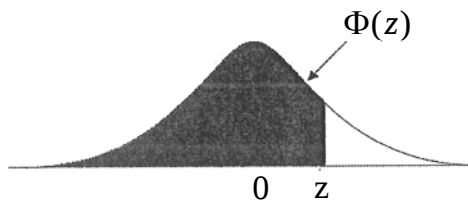
四、為了解員警執法之勤務績效，某交通隊隨機觀察並記錄了 10 位同仁之執法勤務小時數 (X) 及其取締交通違規之件數 (Y) 如下表所示，請利用這些資料完成如下工作：

| 員警編號  | 執勤小時數 (x) | 取締違規件數 (y) | $x^2$ | $y^2$ | xy  |
|-------|-----------|------------|-------|-------|-----|
| 1     | 10        | 11         | 100   | 121   | 110 |
| 2     | 7         | 10         | 49    | 100   | 70  |
| 3     | 10        | 12         | 100   | 144   | 120 |
| 4     | 5         | 6          | 25    | 36    | 30  |
| 5     | 8         | 10         | 64    | 100   | 80  |
| 6     | 8         | 7          | 64    | 49    | 56  |
| 7     | 6         | 9          | 36    | 81    | 54  |
| 8     | 7         | 10         | 49    | 100   | 70  |
| 9     | 9         | 11         | 81    | 121   | 99  |
| 10    | 10        | 10         | 100   | 100   | 100 |
| Total | 80        | 96         | 668   | 952   | 789 |

- (一)請建立取締交通違規績效之線性迴歸模式  $y_i = \beta_0 + \beta_1 x_i$ ，並利用最小平方方法求得模式中兩個參數之估計值  $\widehat{\beta}_0$  與  $\widehat{\beta}_1$ 。(10 分)
- (二)在  $\alpha = 0.05$  之顯著水準下，請檢定虛無假設  $H_0: \beta_1 = 0$ ，並說明檢定結果與結論之意義。(10 分)
- (三)請計算模式校估結果之迴歸係數  $R^2$ ，並說明其意義。(5 分)
- 附註： $\bar{x} = 8$ ； $\bar{y} = 9.6$ ； $S_{xx} = 28$ ； $S_{yy} = 30.4$ ； $S_{xy} = 21$

# 標準常態分配函數表

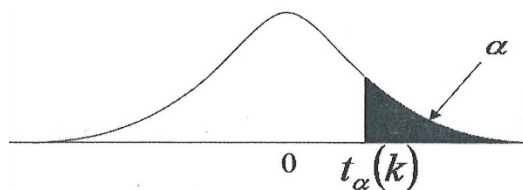
$$P(Z \leq z) = \Phi(z) = \int_{-\infty}^z \frac{1}{\sqrt{2\pi}} e^{-\frac{w^2}{2}} dw$$



| <i>z</i>   | .00    | .01    | .02    | .03    | .04    | .05    | .06    | .07    | .08    | .09    |
|------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| <b>0.0</b> | 0.5000 | 0.5040 | 0.5080 | 0.5120 | 0.5160 | 0.5199 | 0.5239 | 0.5279 | 0.5319 | 0.5359 |
| <b>0.1</b> | 0.5398 | 0.5438 | 0.5478 | 0.5517 | 0.5557 | 0.5596 | 0.5636 | 0.5675 | 0.5714 | 0.5753 |
| <b>0.2</b> | 0.5793 | 0.5832 | 0.5871 | 0.5910 | 0.5948 | 0.5987 | 0.6026 | 0.6064 | 0.6103 | 0.6141 |
| <b>0.3</b> | 0.6179 | 0.6217 | 0.6255 | 0.6293 | 0.6331 | 0.6368 | 0.6406 | 0.6443 | 0.6480 | 0.6517 |
| <b>0.4</b> | 0.6554 | 0.6591 | 0.6628 | 0.6664 | 0.6700 | 0.6736 | 0.6772 | 0.6808 | 0.6844 | 0.6879 |
| <b>0.5</b> | 0.6915 | 0.6950 | 0.6985 | 0.7019 | 0.7054 | 0.7088 | 0.7123 | 0.7157 | 0.7190 | 0.7224 |
| <b>0.6</b> | 0.7257 | 0.7291 | 0.7324 | 0.7357 | 0.7389 | 0.7422 | 0.7454 | 0.7486 | 0.7517 | 0.7549 |
| <b>0.7</b> | 0.7580 | 0.7611 | 0.7642 | 0.7673 | 0.7704 | 0.7734 | 0.7764 | 0.7794 | 0.7823 | 0.7852 |
| <b>0.8</b> | 0.7881 | 0.7910 | 0.7939 | 0.7967 | 0.7995 | 0.8023 | 0.8051 | 0.8078 | 0.8106 | 0.8133 |
| <b>0.9</b> | 0.8159 | 0.8186 | 0.8212 | 0.8238 | 0.8264 | 0.8289 | 0.8315 | 0.8340 | 0.8365 | 0.8389 |
| <b>1.0</b> | 0.8413 | 0.8438 | 0.8461 | 0.8485 | 0.8508 | 0.8531 | 0.8554 | 0.8577 | 0.8599 | 0.8621 |
| <b>1.1</b> | 0.8643 | 0.8665 | 0.8686 | 0.8708 | 0.8729 | 0.8749 | 0.8770 | 0.8790 | 0.8810 | 0.8830 |
| <b>1.2</b> | 0.8849 | 0.8869 | 0.8888 | 0.8907 | 0.8925 | 0.8944 | 0.8962 | 0.8980 | 0.8997 | 0.9015 |
| <b>1.3</b> | 0.9032 | 0.9049 | 0.9066 | 0.9082 | 0.9099 | 0.9115 | 0.9131 | 0.9147 | 0.9162 | 0.9177 |
| <b>1.4</b> | 0.9192 | 0.9207 | 0.9222 | 0.9236 | 0.9251 | 0.9265 | 0.9279 | 0.9292 | 0.9306 | 0.9319 |
| <b>1.5</b> | 0.9332 | 0.9345 | 0.9357 | 0.9370 | 0.9382 | 0.9394 | 0.9406 | 0.9418 | 0.9429 | 0.9441 |
| <b>1.6</b> | 0.9452 | 0.9463 | 0.9474 | 0.9484 | 0.9495 | 0.9505 | 0.9515 | 0.9525 | 0.9535 | 0.9545 |
| <b>1.7</b> | 0.9554 | 0.9564 | 0.9573 | 0.9582 | 0.9591 | 0.9599 | 0.9608 | 0.9616 | 0.9625 | 0.9633 |
| <b>1.8</b> | 0.9641 | 0.9649 | 0.9656 | 0.9664 | 0.9671 | 0.9678 | 0.9686 | 0.9693 | 0.9699 | 0.9706 |
| <b>1.9</b> | 0.9713 | 0.9719 | 0.9726 | 0.9732 | 0.9738 | 0.9744 | 0.9750 | 0.9756 | 0.9761 | 0.9767 |
| <b>2.0</b> | 0.9772 | 0.9778 | 0.9783 | 0.9788 | 0.9793 | 0.9798 | 0.9803 | 0.9808 | 0.9812 | 0.9817 |
| <b>2.1</b> | 0.9821 | 0.9826 | 0.9830 | 0.9834 | 0.9838 | 0.9842 | 0.9846 | 0.9850 | 0.9854 | 0.9857 |
| <b>2.2</b> | 0.9861 | 0.9864 | 0.9868 | 0.9871 | 0.9875 | 0.9878 | 0.9881 | 0.9884 | 0.9887 | 0.9890 |
| <b>2.3</b> | 0.9893 | 0.9896 | 0.9898 | 0.9901 | 0.9904 | 0.9906 | 0.9909 | 0.9911 | 0.9913 | 0.9916 |
| <b>2.4</b> | 0.9918 | 0.9920 | 0.9922 | 0.9925 | 0.9927 | 0.9929 | 0.9931 | 0.9932 | 0.9934 | 0.9936 |
| <b>2.5</b> | 0.9938 | 0.9940 | 0.9941 | 0.9943 | 0.9945 | 0.9946 | 0.9948 | 0.9949 | 0.9951 | 0.9952 |
| <b>2.6</b> | 0.9953 | 0.9955 | 0.9956 | 0.9957 | 0.9959 | 0.9960 | 0.9961 | 0.9962 | 0.9963 | 0.9964 |
| <b>2.7</b> | 0.9965 | 0.9966 | 0.9967 | 0.9968 | 0.9969 | 0.9970 | 0.9971 | 0.9972 | 0.9973 | 0.9974 |
| <b>2.8</b> | 0.9974 | 0.9975 | 0.9976 | 0.9977 | 0.9977 | 0.9978 | 0.9979 | 0.9979 | 0.9980 | 0.9981 |
| <b>2.9</b> | 0.9981 | 0.9982 | 0.9982 | 0.9983 | 0.9984 | 0.9984 | 0.9985 | 0.9985 | 0.9986 | 0.9986 |
| <b>3.0</b> | 0.9987 | 0.9987 | 0.9987 | 0.9988 | 0.9988 | 0.9989 | 0.9989 | 0.9989 | 0.9990 | 0.9990 |
| <b>3.1</b> | 0.9990 | 0.9991 | 0.9991 | 0.9991 | 0.9992 | 0.9992 | 0.9992 | 0.9992 | 0.9993 | 0.9993 |
| <b>3.2</b> | 0.9993 | 0.9993 | 0.9994 | 0.9994 | 0.9994 | 0.9994 | 0.9994 | 0.9995 | 0.9995 | 0.9995 |
| <b>3.3</b> | 0.9995 | 0.9995 | 0.9995 | 0.9996 | 0.9996 | 0.9996 | 0.9996 | 0.9996 | 0.9996 | 0.9997 |
| <b>3.4</b> | 0.9997 | 0.9997 | 0.9997 | 0.9997 | 0.9997 | 0.9997 | 0.9997 | 0.9997 | 0.9997 | 0.9998 |
| <b>3.5</b> | 0.9998 | 0.9998 | 0.9998 | 0.9998 | 0.9998 | 0.9998 | 0.9998 | 0.9998 | 0.9998 | 0.9998 |

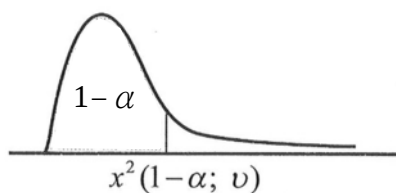
$t$  分配臨界值表

$$P(t > t_{\alpha}(k)) = \alpha$$



| $k(df)$  | $t_{0.100}(k)$ | $t_{0.050}(k)$ | $t_{0.025}(k)$ | $t_{0.010}(k)$ | $t_{0.005}(k)$ |
|----------|----------------|----------------|----------------|----------------|----------------|
| 1        | 3.078          | 6.314          | 12.706         | 31.821         | 63.657         |
| 2        | 1.886          | 2.920          | 4.303          | 6.965          | 9.925          |
| 3        | 1.638          | 2.353          | 3.182          | 4.541          | 5.841          |
| 4        | 1.533          | 2.132          | 2.776          | 3.747          | 4.604          |
| 5        | 1.476          | 2.015          | 2.571          | 3.365          | 4.032          |
| 6        | 1.440          | 1.943          | 2.447          | 3.143          | 3.707          |
| 7        | 1.415          | 1.895          | 2.365          | 2.998          | 3.499          |
| 8        | 1.397          | 1.860          | 2.306          | 2.896          | 3.355          |
| 9        | 1.383          | 1.833          | 2.262          | 2.821          | 3.250          |
| 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          |
| 25       | 1.316          | 1.708          | 2.060          | 2.485          | 2.787          |
| 26       | 1.315          | 1.706          | 2.056          | 2.479          | 2.779          |
| 27       | 1.314          | 1.703          | 2.052          | 2.473          | 2.771          |
| 28       | 1.313          | 1.701          | 2.048          | 2.467          | 2.763          |
| 29       | 1.311          | 1.699          | 2.045          | 2.462          | 2.756          |
| $\infty$ | 1.282          | 1.645          | 1.960          | 2.326          | 2.576          |

# $\chi^2$ 分配表



| $v$ | $1-\alpha$           |                      |                      |                      |        |       |       |       |       |       |
|-----|----------------------|----------------------|----------------------|----------------------|--------|-------|-------|-------|-------|-------|
|     | .005                 | .010                 | .025                 | .050                 | .100   | .900  | .950  | .975  | .990  | .995  |
| 1   | 0.0 <sup>4</sup> 393 | 0.0 <sup>3</sup> 157 | 0.0 <sup>3</sup> 982 | 0.0 <sup>2</sup> 393 | 0.0158 | 2.71  | 3.84  | 5.02  | 6.63  | 7.88  |
| 2   | 0.0100               | 0.0201               | 0.0506               | 0.103                | 0.211  | 4.61  | 5.99  | 7.38  | 9.21  | 10.60 |
| 3   | 0.072                | 0.115                | 0.216                | 0.352                | 0.584  | 6.25  | 7.81  | 9.35  | 11.34 | 12.84 |
| 4   | 0.207                | 0.297                | 0.484                | 0.711                | 1.064  | 7.78  | 9.49  | 11.14 | 13.28 | 14.86 |
| 5   | 0.412                | 0.554                | 0.831                | 1.145                | 1.61   | 9.24  | 11.07 | 12.83 | 15.09 | 16.75 |
| 6   | 0.676                | 0.872                | 1.24                 | 1.64                 | 2.20   | 10.64 | 12.59 | 14.45 | 16.81 | 18.55 |
| 7   | 0.989                | 1.24                 | 1.69                 | 2.17                 | 2.83   | 12.02 | 14.07 | 16.01 | 18.48 | 20.28 |
| 8   | 1.34                 | 1.65                 | 2.18                 | 2.73                 | 3.49   | 13.36 | 15.51 | 17.53 | 20.09 | 21.96 |
| 9   | 1.73                 | 2.09                 | 2.70                 | 3.33                 | 4.17   | 14.68 | 16.92 | 19.02 | 21.67 | 23.59 |
| 10  | 2.16                 | 2.56                 | 3.25                 | 3.94                 | 4.87   | 15.99 | 18.31 | 20.48 | 23.21 | 25.19 |
| 11  | 2.60                 | 3.05                 | 3.82                 | 4.57                 | 5.58   | 17.28 | 19.68 | 21.92 | 24.73 | 26.76 |
| 12  | 3.07                 | 3.57                 | 4.40                 | 5.23                 | 6.30   | 18.55 | 21.03 | 23.34 | 26.22 | 28.30 |
| 13  | 3.57                 | 4.11                 | 5.01                 | 5.89                 | 7.04   | 19.81 | 22.36 | 24.74 | 27.69 | 29.82 |
| 14  | 4.07                 | 4.66                 | 5.63                 | 6.57                 | 7.79   | 21.06 | 23.68 | 26.12 | 29.14 | 31.32 |
| 15  | 4.60                 | 5.23                 | 6.26                 | 7.26                 | 8.55   | 22.31 | 25.00 | 27.49 | 30.58 | 32.80 |
| 16  | 5.14                 | 5.81                 | 6.91                 | 7.96                 | 9.31   | 23.54 | 26.30 | 28.85 | 32.00 | 34.27 |
| 17  | 5.70                 | 6.41                 | 7.56                 | 8.67                 | 10.09  | 24.77 | 27.59 | 30.19 | 33.41 | 35.72 |
| 18  | 6.26                 | 7.01                 | 8.23                 | 9.39                 | 10.86  | 25.99 | 28.87 | 31.53 | 34.81 | 37.16 |
| 19  | 6.84                 | 7.63                 | 8.91                 | 10.12                | 11.65  | 27.20 | 30.14 | 32.85 | 36.19 | 38.58 |
| 20  | 7.43                 | 8.26                 | 9.59                 | 10.85                | 12.44  | 28.41 | 31.41 | 34.17 | 37.57 | 40.00 |
| 21  | 8.03                 | 8.90                 | 10.28                | 11.59                | 13.24  | 29.62 | 32.67 | 35.48 | 38.93 | 41.40 |
| 22  | 8.64                 | 9.54                 | 10.98                | 12.34                | 14.04  | 30.81 | 33.92 | 36.78 | 40.29 | 42.80 |
| 23  | 9.26                 | 10.20                | 11.69                | 13.09                | 14.85  | 32.01 | 35.17 | 38.08 | 41.64 | 44.18 |
| 24  | 9.89                 | 10.86                | 12.40                | 13.85                | 15.66  | 33.20 | 36.42 | 39.36 | 42.98 | 45.56 |
| 25  | 10.52                | 11.52                | 13.12                | 14.61                | 16.47  | 34.38 | 37.65 | 40.65 | 44.31 | 46.93 |
| 26  | 11.16                | 12.20                | 13.84                | 15.38                | 17.29  | 35.56 | 38.89 | 41.92 | 45.64 | 48.29 |
| 27  | 11.81                | 12.88                | 14.57                | 16.15                | 18.11  | 36.74 | 40.11 | 43.19 | 46.96 | 49.64 |
| 28  | 12.46                | 13.56                | 15.31                | 16.93                | 18.94  | 37.92 | 41.34 | 44.46 | 48.28 | 50.99 |
| 29  | 13.12                | 14.26                | 16.05                | 17.71                | 19.77  | 39.09 | 42.56 | 45.72 | 49.59 | 52.34 |
| 30  | 13.79                | 14.95                | 16.79                | 18.49                | 20.60  | 40.26 | 43.77 | 46.98 | 50.89 | 53.67 |
| 40  | 20.71                | 22.16                | 24.43                | 26.51                | 29.05  | 51.81 | 55.76 | 59.34 | 63.69 | 66.77 |
| 50  | 27.99                | 29.71                | 32.36                | 34.76                | 37.69  | 63.17 | 67.50 | 71.42 | 76.15 | 79.49 |
| 60  | 35.53                | 37.48                | 40.48                | 43.19                | 46.46  | 74.40 | 79.08 | 83.30 | 88.38 | 91.95 |
| 70  | 43.28                | 45.44                | 48.76                | 51.74                | 55.33  | 85.53 | 90.53 | 95.02 | 100.4 | 104.2 |
| 80  | 51.17                | 53.54                | 57.15                | 60.39                | 64.28  | 96.58 | 101.9 | 106.6 | 112.3 | 116.3 |
| 90  | 59.20                | 61.75                | 65.65                | 69.13                | 73.29  | 107.6 | 113.1 | 118.1 | 124.1 | 128.3 |
| 100 | 67.33                | 70.06                | 74.22                | 77.93                | 82.36  | 118.5 | 124.3 | 129.6 | 135.8 | 140.2 |