

109年公務人員特種考試關務人員、身心障礙人員考試及  
109年國軍上校以上軍官轉任公務人員考試試題

考試別：身心障礙人員考試

等別：四等考試

類科：經建行政

科目：統計學概要

考試時間：1小時30分

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、家電用品店想了解店門口上方的跑馬燈廣告是否對於消費者購買產品有作用。為了獲得這方面的資料，店長對進入店裡的消費者進行調查，詢問是否有看到跑馬燈廣告及是否有購買所廣告的產品。店長整理所蒐集來的資料後製作出下列的聯合機率表：

|      | 看過廣告 | 沒有看過廣告 |
|------|------|--------|
| 購買   | 0.10 | 0.03   |
| 沒有購買 | 0.21 | 0.66   |

若隨機抽一位消費者，試問：

- (一)此消費者看過廣告的機率？(5分)
- (二)此消費者沒有購買的機率？(5分)
- (三)已知此消費者看過廣告，他/她有購買的機率？(5分)
- (四)已知此消費者沒有看過廣告，他/她有購買的機率？(10分)
- 二、在一個新聞媒介使用的民調中隨機選取300位民眾，詢問她／他們獲得新聞資訊的主要來源，其中有143位回答電視新聞為其獲得新聞資訊的主要來源。試問：
- (一)計算出民眾以電視新聞為其獲得新聞資訊主要來源之母體比例95%的信賴區間。(10分)
- (二)在95%的信賴水準下，當邊際誤差(margin of error)為0.05時，估計母體比例所需選取的樣本數為何？(10分)
- (三)影響信賴區間長度的因素有那些？(5分)

三、研究人員想了解不同年齡層與所觀看的電視頻道是否有相關。隨機訪問 582 位民眾，詢問其三個電視頻道（A、B 及 C）中最喜歡的頻道，並獲得受訪民眾之年齡資料。樣本觀察值分布如下：

|      | 25 歲以下 | 26 歲至 39 歲 | 40 歲以上 |
|------|--------|------------|--------|
| 頻道 A | 41     | 27         | 51     |
| 頻道 B | 36     | 3          | 40     |
| 頻道 C | 169    | 106        | 109    |

顯著水準為 0.05 情況下，請使用下列統計方法檢定年齡層與所觀看的電視頻道是否相關。

(一) 拒絕域法。(15 分)

(二) P 值法。(10 分)

四、消費者想了解及比較兩品牌（A 與 B）熱水器故障檢測維修的服務品質。隨機蒐集各 10 台熱水器故障後，消費者打電話叫修至技術員到府所花的時間（單位：小時）資料如下：

|      |    |    |    |    |    |    |    |    |    |    |
|------|----|----|----|----|----|----|----|----|----|----|
| 品牌 A | 24 | 18 | 28 | 19 | 22 | 15 | 23 | 22 | 18 | 27 |
| 品牌 B | 23 | 19 | 25 | 21 | 22 | 20 | 24 | 23 | 21 | 22 |

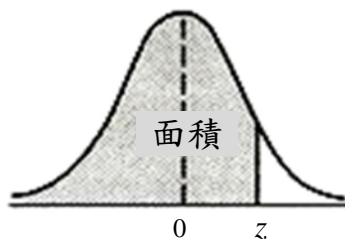
(一) 計算兩品牌熱水器故障後，消費者打電話叫修至技術員到府分別所花時間之平均數及中位數。(10 分)

(二) 計算兩品牌熱水器故障後，消費者打電話叫修至技術員到府分別所花時間之標準差。(10 分)

(三) 由(一)及(二)的結果，那一種品牌熱水器有較穩定的電話叫修服務？請說明理由。(5 分)

## 附表

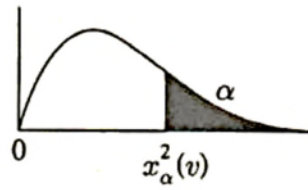
## 常態曲線下之面積



| $z$  | .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 | .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

卡方分配右尾機率值之臨界點



| $\alpha \backslash v$ | 0.995                | 0.99                 | 0.975                | 0.95                | 0.90   | 0.75  | 0.50  | 0.25  | 0.10  | 0.05  | 0.025 | 0.01  | 0.005 |
|-----------------------|----------------------|----------------------|----------------------|---------------------|--------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1                     | 0.0 <sup>4</sup> 393 | 0.0 <sup>3</sup> 157 | 0.0 <sup>3</sup> 982 | 0.0 <sup>2</sup> 39 | 0.0158 | 0.102 | 0.455 | 1.323 | 2.71  | 3.84  | 5.02  | 6.63  | 7.88  |
| 2                     | 0.0100               | 0.0201               | 0.0506               | 0.103               | 0.211  | 0.575 | 1.386 | 2.77  | 4.61  | 5.99  | 7.38  | 9.21  | 10.60 |
| 3                     | 0.0717               | 0.115                | 0.216                | 0.352               | 0.584  | 1.213 | 2.37  | 4.11  | 6.25  | 7.81  | 9.35  | 11.34 | 12.84 |
| 4                     | 0.207                | 0.297                | 0.484                | 0.711               | 1.064  | 1.923 | 3.36  | 5.39  | 7.78  | 9.49  | 11.14 | 13.38 | 14.86 |
| 5                     | 0.412                | 0.554                | 0.831                | 1.145               | 1.610  | 2.67  | 4.35  | 6.63  | 9.24  | 11.07 | 12.83 | 15.09 | 16.75 |
| 6                     | 0.676                | 0.872                | 1.237                | 1.635               | 2.20   | 3.45  | 5.35  | 7.84  | 10.64 | 12.59 | 14.45 | 16.81 | 18.55 |
| 7                     | 0.989                | 1.239                | 1.690                | 2.17                | 2.83   | 4.25  | 6.35  | 9.04  | 12.02 | 14.07 | 16.01 | 18.48 | 20.3  |
| 8                     | 1.344                | 1.646                | 2.18                 | 2.73                | 3.49   | 5.07  | 7.34  | 10.22 | 13.36 | 15.51 | 17.53 | 20.1  | 22.0  |
| 9                     | 1.735                | 2.09                 | 2.70                 | 3.33                | 4.17   | 5.90  | 8.34  | 11.39 | 14.68 | 16.92 | 19.02 | 21.7  | 23.6  |
| 10                    | 2.16                 | 2.56                 | 3.25                 | 3.94                | 4.87   | 6.74  | 9.34  | 12.55 | 15.99 | 18.31 | 20.5  | 23.2  | 25.2  |
| 11                    | 2.60                 | 3.05                 | 3.82                 | 4.57                | 5.58   | 7.58  | 10.34 | 13.70 | 17.28 | 19.68 | 21.9  | 24.7  | 26.8  |
| 12                    | 3.07                 | 3.57                 | 4.40                 | 5.23                | 6.30   | 8.44  | 11.34 | 14.85 | 18.55 | 21.0  | 23.3  | 26.2  | 28.3  |
| 13                    | 3.57                 | 4.11                 | 5.01                 | 5.89                | 7.04   | 9.30  | 12.34 | 15.98 | 19.81 | 22.4  | 24.7  | 27.7  | 29.8  |
| 14                    | 4.07                 | 4.66                 | 5.63                 | 6.57                | 7.79   | 10.17 | 13.34 | 17.12 | 21.1  | 23.7  | 26.1  | 29.1  | 31.3  |
| 15                    | 4.60                 | 5.23                 | 6.26                 | 7.26                | 8.55   | 11.04 | 14.34 | 18.25 | 22.3  | 25.0  | 27.5  | 30.6  | 32.8  |
| 16                    | 5.14                 | 5.81                 | 6.91                 | 7.96                | 9.31   | 11.91 | 15.34 | 19.37 | 23.5  | 26.3  | 28.8  | 32.0  | 34.3  |
| 17                    | 5.70                 | 6.41                 | 7.56                 | 8.67                | 10.09  | 12.79 | 16.34 | 20.5  | 24.8  | 27.6  | 30.2  | 33.4  | 35.7  |
| 18                    | 6.26                 | 7.01                 | 8.23                 | 9.39                | 10.86  | 13.68 | 17.34 | 21.6  | 26.0  | 28.9  | 31.5  | 34.8  | 37.2  |
| 19                    | 6.84                 | 7.63                 | 8.91                 | 10.12               | 11.65  | 14.56 | 18.34 | 22.7  | 27.2  | 30.1  | 32.9  | 36.2  | 38.6  |
| 20                    | 7.43                 | 8.26                 | 9.59                 | 10.85               | 12.44  | 15.45 | 19.34 | 23.8  | 28.4  | 31.4  | 34.2  | 37.6  | 40.0  |
| 21                    | 8.03                 | 8.90                 | 10.28                | 11.59               | 13.24  | 16.34 | 20.3  | 24.9  | 29.6  | 32.7  | 35.5  | 38.9  | 41.4  |
| 22                    | 8.64                 | 9.54                 | 10.98                | 12.34               | 14.04  | 17.24 | 21.3  | 26.0  | 30.8  | 33.9  | 36.8  | 40.3  | 42.8  |
| 23                    | 9.26                 | 10.20                | 11.69                | 13.09               | 14.85  | 18.14 | 22.3  | 27.1  | 32.0  | 35.2  | 38.1  | 41.6  | 44.2  |
| 24                    | 9.89                 | 10.86                | 12.40                | 13.85               | 15.66  | 19.04 | 23.3  | 28.2  | 33.2  | 36.4  | 39.4  | 43.0  | 45.6  |
| 25                    | 10.52                | 11.52                | 13.12                | 14.61               | 16.47  | 19.94 | 24.3  | 29.3  | 34.4  | 37.7  | 40.6  | 44.3  | 46.9  |
| 26                    | 11.16                | 12.20                | 13.84                | 15.38               | 17.29  | 20.8  | 25.3  | 30.4  | 35.6  | 38.9  | 41.9  | 45.6  | 48.3  |
| 27                    | 11.81                | 12.88                | 14.57                | 16.15               | 18.11  | 21.7  | 26.3  | 31.5  | 36.7  | 40.1  | 43.2  | 47.0  | 49.6  |
| 28                    | 12.46                | 13.56                | 15.31                | 16.93               | 18.94  | 22.7  | 27.3  | 32.6  | 37.9  | 41.3  | 44.5  | 48.3  | 51.0  |
| 29                    | 13.12                | 14.26                | 16.05                | 17.71               | 19.77  | 23.6  | 28.3  | 33.7  | 39.1  | 42.6  | 45.7  | 49.6  | 52.3  |
| 30                    | 13.79                | 14.95                | 16.79                | 18.49               | 20.6   | 24.5  | 29.3  | 34.8  | 40.3  | 43.8  | 47.0  | 50.9  | 53.7  |
| 40                    | 20.7                 | 22.2                 | 24.4                 | 26.5                | 29.1   | 33.7  | 39.3  | 45.6  | 51.8  | 55.8  | 59.3  | 63.7  | 66.3  |
| 50                    | 28.0                 | 29.7                 | 32.4                 | 34.8                | 37.7   | 42.9  | 49.3  | 56.3  | 63.2  | 67.5  | 71.4  | 76.2  | 79.5  |
| 60                    | 35.5                 | 37.5                 | 40.5                 | 43.2                | 46.5   | 52.3  | 59.3  | 67.0  | 74.4  | 79.1  | 83.3  | 88.4  | 92.0  |
| 70                    | 43.3                 | 45.4                 | 48.8                 | 51.7                | 55.3   | 61.7  | 69.3  | 77.6  | 85.5  | 90.5  | 95.0  | 100.4 | 104.2 |
| 80                    | 51.2                 | 53.5                 | 57.2                 | 60.4                | 64.3   | 71.1  | 79.3  | 88.1  | 96.6  | 101.9 | 106.6 | 112.3 | 116.3 |
| 90                    | 59.2                 | 61.8                 | 65.6                 | 69.1                | 73.3   | 80.6  | 89.3  | 98.6  | 107.6 | 113.1 | 118.1 | 124.1 | 128.3 |
| 100                   | 67.3                 | 70.1                 | 74.2                 | 77.9                | 82.4   | 90.1  | 99.3  | 109.1 | 118.5 | 124.3 | 129.6 | 135.8 | 140.2 |