

注意：計算題請寫出計算式，否則將不予計分！

1. Explain the following terms (32% , 4% each)
 (1) Variance (2) Central Limit Theorem (3) Power of the test (4) Regression coefficient
 (5) Parameter (6) Kruskal-Wallis test (7) Test for Goodness of Fit (8) Median

2. Please list the assumptions of Model I ANOVA. (8 %)

3. A recent report in Science summarizing a large Norwegian study claimed that first-born children have higher IQ's than later born children. To test the hypothesis that birth order influences IQ, you decide to do a small study of your own. Nine of your friends volunteered to report their scores on a standardized test as well as scores for their siblings. Below is the data which can be assumed to be normally distributed. Do your data support the claims of the larger study reported in Science ? (10 %)

| Pair | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| First born | 113 | 125 | 130 | 117 | 132 | 108 | 110 | 120 | 130 |
| Second born | 105 | 122 | 129 | 118 | 128 | 109 | 107 | 118 | 127 |

4. The following data are the carapace (shell) lengths in centimeters of a sample of adult female green turtles *Chelonia mydas* measured while nesting at Heron Island in Australia's Great Barrier Reef. Calculate the following statistics for this sample: sample mean, sample variance, standard error, standard deviation and median. (10%)

109 104 116 113 95 115 98 97 93 120

5. One hundred random mud samples were taken from a lake bottom in order to determine whether two species of the genus *Stylaria* are associated, that is, tend to occur together. Analyze the results below to determine if a significant association between these two species exists. (10 %)

| | | Species A | |
|-----------|---------|-----------|--------|
| | | Present | Absent |
| Species B | Present | 50 | 10 |
| | Absent | 24 | 16 |

6. The following statistics were obtained from measurements of the circumferences of trees of three species. Test the null hypothesis that circumferences of the trees is the same for the three species. (15 %)

| | Species A | Species B | Species C |
|----------------------------------|-----------|-----------|-----------|
| n | 10 | 15 | 10 |
| Mean (m) | 2.1 | 1.6 | 1.4 |
| S ² (m ²) | 0.49 | 0.28 | 0.15 |

7. As part of a study of the environmental effects of large highways on nearby ecosystems, the cadmium concentrations (conc.) in grasses at different distances from a major highway were measured. The results are presented below. Compute the least squares regression equation for these data and test the equation's significance with ANOVA. (15 %)

| Distance (m) | 1 | 2 | 3 | 4 | 5 | 10 |
|------------------|-----|----|----|----|----|----|
| Cd conc. (µg/kg) | 100 | 47 | 38 | 29 | 17 | 8 |

$F_{0.05,1,8} = 5.32$ $F_{0.05,2,32} = 3.30$ $\chi^2_{0.05,1} = 3.84$ $F_{0.05,1,4} = 7.71$

試題隨卷繳回