

系所組別： 認知科學研究所

考試科目： 統計學

考試日期： 0308 · 節次： 3

※ 考生請注意：本試題 可 不可 使用計算機

1. Estimate maximum and minimum of $f(x)$ on the given interval through differentiation (10 points), and graph $f(x)$ on the given interval (10 points).

$$f(x) = \frac{2x}{1+x^2}; \text{ interval } [-2, 2].$$

2. Calculate the integral $\int \frac{7}{(x-2)(x+5)} dx$ (10 points).

3. Students are asked to come to the laboratory 15 minutes before the final exam. In the lab, the psychologist records physiological measures of anxiety (heart rate, skin resistance, blood pressure, etc) for each participant. Additionally, the psychologist obtains the exam score for each participant. Compute the Person correlation for the following data: (10 points)

Student	Anxiety rating	Exam score
1	5	80
2	2	88
3	7	80
4	7	79
5	4	86
6	5	85

4. A common test of short-term memory requires participants to repeat a random string of digits that was presented a few seconds earlier. The number of digits is increased on each trial until the person begins to make mistakes. The longest string that can be reported accurately determines the participant's score. The following data were obtained from a sample of $n = 11$ participants. The scores are 7, 9, 8, 10, 8, 6, 7, 8, 7, 6, 5.
- (A) Compute the mean and variance for the sample. (5 points)
- (B) Make an 80% confidence interval estimate of the mean. (10 points)
5. A population consists of the following 6 scores: 0, 4, 6, 1, 3, 4.
- (A) Find the z-score for each score in the population. (5 points)
- (B) Transform the original population into a new population with a mean of 50 and a standard deviation of 10. (10 points)
6. A developmental psychologist has presented a training program that, according to a psychological theory, should improve problem-solving ability. For the population of six-years-old, the average score on a standardized problem-solving test is known to be the mean of 80 and the standard deviation of 10. To test the effectiveness of the training program, a random program of 18 six-years-old children is selected. After training, the average score for the sample is 84.44. Can the experimenter conclude that the program has an effect using a two-tailed test with $\alpha = .05$ (critical $z = \pm 1.96$)? (15 points)

(背面仍有題目,請繼續作答)

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7. On a standardized spatial skills task, normative data reveal that people typically get $\mu = 15$ correct solutions. A psychologist tests 7 individuals who have brain injuries in the right cerebral hemisphere. For the following data, determine whether or not right-hemisphere damage results in significantly reduced performance on the spatial skills task. Test with alpha set at .05 with one tail ($t(6) = -1.943$). The data are as follows: 12, 16, 9, 8, 10, 17, 10. (15 points)