※ 考生請注意：本試題不可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. (20%) Choose between the alternatives: $H_0 : \mu = 10$; $H_a : \mu \neq 10$ when α (type I error) is to be controlled at 0.02 and: $n = 25$ (number of observations); $\overline{Y} = 5.7$ (sample mean); $s = 8$ (sample standard deviation). State the decision rule in detail based upon the information.

2. (20%) For boys, the average number of absences in the first grade is 15 with a standard deviation of 7; for girls, the average number of absences is 10 with a standard deviation of 6. In a nationwide survey, suppose 100 boys and 50 girls are sampled. In order to calculate the probability that the male sample will have at most three more days of absences than the female sample, please find the z-score that produced when boys have three more days of absences than girls.

3. (20%) Let X and Y be independent Poisson random variables with respective means λ_1 and λ_2. Calculate the distribution of $X + Y$.

4. (20%) The NCKU Noodle Company supplied packaged noodle to a large number of supermarkets in a metropolitan area. An experimental study was made of the effects of height of the shelf display (bottom, middle, top) and the width of the shelf display (regular, wide) on sales of the NCKU noodle (measures in cases) during the experimental period. Twelve supermarkets, similar in terms of sales volumes and clientele, were utilized in the study. These stores were assigned at random to each of the six treatments according to a completely randomized design, and the display of the noodle in each store followed the treatment specifications for that store. Sales of the noodle were recorded, and these results are presented in the following Table. Construct a detail ANOVA table for the two-factor study with fixed factor levels.

Display height	Display width	
	Regular	Wide
Bottom	47	46
	43	40
Middle	62	67
	68	71
Top	41	42
	39	46

5. (20%) In an experimental involving 12 similar but scattered suburban branch offices of a commercial bank, holders of checking accounts at the offices were offered gifts for setting up money market accounts. Minimum initial deposits in the new money market account were specified minimum deposit. Various levels of minimum deposit and related gift values were used in the experiment to ascertain the relation between the specified minimum deposit and gift value, on the other hand, and number of accounts opened at the office, on the other hand. Altogether, six levels of minimum deposit and proportional gift value were used, with two of the branch offices assigned at random to each level. One branch office had a fire during the period and was dropped from the study. The following Table contains the results, where X is the amount of minimum deposit and Y is the number of new money market accounts that were opened and qualified for the gift during the test period. A linear regression function was fitted in the usual fashion; it is $\hat{Y} = 50.72251 + 0.4867X$. The ANOVA is shown in the following Table. In order to test that a linear regression function is inappropriate formally, please calculate the F statistic for lack-of-fit test.

Data					
Branch	Size of Minimum deposit ($)	Number of New Account	Branch	Size of Minimum deposit ($)	Number of New Account
1	125	160	7	75	42
2	100	112	8	175	124
3	200	124	9	125	150
4	75	28	10	200	104
5	150	152	11	100	136
6	175	156			

ANOVA Table			
Source of Variation	Sum of Square	Degree of Freedom	Mean Sum of Square
Regression	5141.3	1	5141.3
Error	14741.6	9	1638.0
Total	19882.9	10	