注意:計算題請寫出計算式，否則不予計分。

1. Explain the following terms (28 分,每小題 4 分)
   (1) Central limit theorem　　(2) Significant level　　(3) Standard deviation　　(4) Median
   (5) Friedman test　　(6) Standard normal distribution　　(7) Simple random sample

2. Wildlife managers studying various populations of the tiger frog gathered the following information from three areas. Weights were recorded in grams. Are there significant differences in weights of the frog among these areas? Assume normality. (15 分)

	Taitung	Pingtung	Hualian
Sample size	40	50	55
mean	90	84	81
Standard deviation	7	6	7

3. An experiment was conducted to compare the performance of two varieties of rice, A and B. Eight farms were randomly chosen for the experiment and the yields in metric tons per hectare for each variety on each farm were as follows: (15 分)

Farm	1	2	3	4	5	6	7	8
Yield of variety A	4.6	4.9	3.1	4.7	4.2	3.8	4.2	4.0
Yield of variety B	4.0	4.2	3.4	4.0	4.4	3.2	3.9	3.8

Carry out a hypothesis test to decide whether the mean yields are the same for the two varieties.

4. As part of a larger study of population genetics, the importance of cryptic coloration in peppered moths was studied. Two color morphs (one light and one dark) were placed on an intermediate background. Hungry starlings were then given 10 minutes to eat their fill. The results of the preliminary experiment are given below. Analyze the data with a 2 x 2 contingency table. (15 分)

Fate	Light morph	Dark morph
not eaten	32	12
eaten	15	24

5. A student undertakes a project to determine the effect of carbon dioxide on respiration rate using the following methodology. A volunteer inhaled air from a bag containing a predetermined amount of carbon dioxide (with partial pressure measured in torr) and the number of breaths per minute was recorded. Her data are given below: (15 分)

Partial pressure CO_2 (torr) , X	32	34	36	38	40	42	44	46
Respiration rate (breaths/min) , Y	8	10	11	12	13	15	18	19

   (a) Compute the linear regression equation so that Y may be predicted from X.
   (b) Test the significance of this regression equation via ANOVA with $H_0 : \beta = 0$.

6. In a pilot study, a public health survey of 1500 people aged 40 to 49 in Boston revealed that 30 had AIDS. Estimate the population proportion and find a 95 % confidence interval for the estimate. Express your answer as a rate per 100, 000. (12 分)

$t_{0.05,7} = 2.36$　　$t_{0.05,6} = 2.45$　　$t_{0.05,8} = 2.31$　　$F_{0.05,2,142} = 3.06$　　$\chi^2_{0.05,1} = 3.84$　　$\chi^2_{0.05,2} = 5.99$