* 注意:計算題請寫出計算式，否則不予計分!

1. Explain the following terms (40% , 5 % each)

    (1) ANOVA   (2) Standard error   (3) Type I error

    (4) Standard Normal Distribution   (5) Accuracy   (6) Variance

    (7) Simple random sample   (8) Coefficient of determination

2. Three diets were tested for differences in weight gain of rats after a specified period of time. Six inbred laboratory lines were used to investigate the response of different genotypes to the various diets. The lines were blocked and diets assigned randomly. Are there significant differences among the diets in their ability to facilitate weight gain? The units are grams of increase. (15 %)

Diet	Inbred line (jth)					
	A	B	C	D	E	F
I	8	6	7	9	2	3
II	4	2	6	5	1	2
III	5	4	3	4	3	8

$F_{2, 10, 0.05} = 2.92$ $F_{2, 15, 0.05} = 2.70$

3. A biology student wishes to determine the relationship between temperature and heart rate in the common leopard frog. He manipulates the temperatures in 2° increments ranging from 4 to 16 ^{0}C and records the heart rate at each interval. His data are presented in table form below.

    (a) Compute the linear regression equation so that Y may be predicted from X.

    (b) Test the significance of the regression equation via ANOVA with Ho : $\beta = 0$

    (c) Are temperature and heart beat correlated ?   (15 %) $F_{1, 5, 0.05} = 4.06$

Recording number	1	2	3	4	5	6	7
X Temperature (^{0}C)	4	6	8	10	12	14	16
Y Heart rate (beats per minute)	11	12	20	24	30	31	29

4. In a study of hermit crab behavior carried out at one Island, a random sample of two types of gastropod shells was collected. Each shell was occupied by one of two species of hermit crab. Do both species of hermit crabs occupy each shell type in the same proportion. Carry out the test at the $\alpha = 0.05$ level. (10 %) $\chi^2_{0.95, 1} = 3.84$

Species	Shell A	Shell B
Crab A	154	39
Crab B	6	37

5. An ornithologists studying wedge-tailed eagles found that 40% of a population were males. Seventy-five percent of the population were reddish-brown while the rest were black. Twenty percent were reddish-brown males.

    (a) What percent of the population were black females?

    (b) If you can tell the color but not the sex at a long distance and you see a black eagle with your binoculars, what is the probability that it is a male ?   (10 %)

6. A wildlife toxicologist studying the effects of pollution on natural ecosystem measured the concentration of heavy metals in the blood of 25 sea lions. Their mean concentration of heavy metals was 6 ug/l and the standard deviation was 1 ug/l. Construct 95% confidence intervals for the population mean from these statistics. (10 %) $t_{24, 0.05} = 2.064$

試題隨卷繳回