●可使用現行『國家考試電子計算器規格標準』規定第一類之計算機

一、計算題 (100%)

注意：此份試題並無提供統計分配表(distribution table)，考生須自行根據統計量判斷是否拒絕虛無假設。

1.　(10 points, Each one is 5 points)

A newspaper reported that the average age of men who were getting married for the first time was more than 25 years. David selected a sample of 100 men who were recently married and found that the average age was 28 years and the standard deviation of the sample was 3.5 years. Assume that the variable is approximately normally distributed.

(1)　What is the null hypothesis?

(2)　Is there enough evidence to support the argument that the average age is more than 25 years on the basis of the sample at $\alpha = 0.05$.?

2.　(10 points, Each one is 5 points)

Consider the following information regarding three securities:

State of Economy	Probability	Rate of Return if State Occurs		
		Security X	Security Y	Security Z
Boom	0.10	0.35	0.45	0.27
Good	0.60	0.16	0.10	0.08
Poor	0.25	-0.01	-0.06	-0.04
Bust	0.05	-0.12	-0.20	-0.09

Your portfolio is invested 30 percent each in X and Z, and 40 percent in Y.

(1)　What is the expected return of the portfolio?

(2)　What is the standard deviation of the portfolio?

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3. (10 points)

You want to find out if there is a difference in spending per student between boy and girl. You collect the following information:

	Boy	Girl
Number	35	35
Mean	$6,012	$5,832
Std Dev	$602	$497

Is there any difference in population means ($a = .10$)?

4. (10 points, Each one is 5 points)

If Bob buys a TV of YZU. A magazine reported that mean TV lifespan of YZU is 20,000 hours, and the standard deviation is 2,000 hours. According the information, answer the following questions:

(1) What is the probability when the TV lifespan is more than 23290 hours?

(2) What is the probability when the battery lifespan is less than 16000 hours?

5. (10 points)

John wants to find out whether the mean income of the three areas (X, Y, Z) are different. If 15 families are randomly selected from three areas, and their income information are given below:

X	Y	Z
254	234	200
263	218	222
241	235	197
237	227	206
251	216	204

Construct the ANOVA table.

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6. (10 points, Each one is 5 points)

100 students are randomly selected to examine the relation between grades and sexuality/the absents of the student. The regression model is as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon$$

where　　Y = Grades.

X_1 = Number of skipping class (absents).

$X_2 = 1$ if the student is a girl, 0 if the student is a boy.

The regression results are:

	Coefficients	Standard Error	t Stat	P-value
Intercept	80.65	6.52	12.37	9.14E-05
X_1	-2.52	0.45	-5.60	0.0001
X_2	5.13	1.35	3.80	0.0001

(1) What is the predicted value for a boy with 5 absents?

(2) What is the predicted value for a girl with 2 absents?

7. (40 points, Each one is 5 points)

If 8 companies are randomly selected, and related information regarding these companies are given below:

Company	1	2	3	4	5	6	7	8
Advertising Expenses (X)	300	400	500	500	800	1000	1000	1300
Sales(Y)	9500	10300	11000	12000	12400	13400	14500	15300

Cindy wants to test the regression model:　$Y = \beta_0 + \beta_1 X + \varepsilon$

Suppose estimated regression result is:　$\hat{Y} = \hat{b}_0 + \hat{b}_1 X$

Answer the following questions:

(1) What is the coefficient of the slope in the estimated regression?

(2) What is the coefficient of the intercept in the estimated regression?

(3) What is the mean squared error (MSE) of the above regression?

(4) What is the standard error of $\hat{b}_1$?

(5) What is the adjusted R-square?

(6) What is the F-statistics of this regression?

(7) What is the standard deviation of *Advertising Expenses* (X)?

(8) What is the correlation coefficient between *Advertising Expenses* and *Sales*?

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