國立臺北大學九十五學年度碩士班招生考試試題

系（所）別：國際企業研究所　　共 3 頁
科　　目：統計學　　第 1 頁

☑可　☐不可 使用計算機

1. A seasonal time series data for certain product were collected for 12 years (from the first season in the first year to the 4th season in the 12th year.) where PRICE = UNIT PRICE, NSTORE = number of chain stores, TSALES = the total sales. Set S1 = 1, for the observations from the first season, S1 = 0, elsewhere. Set S2 = 1, for the observations from the second season, S2 = 0, elsewhere. Set S3 = 1, for the observations from the third season, S3 = 0, elsewhere. A regression analysis of TSALES on PRICE, NSTORE, S1, S2 and S3 was performed and resulted the following:

Model: $TSALES = \beta_0 + \beta_1 PRICE + \beta_2 NSTORE + \beta_3 S1 + \beta_4 S2 + \beta_5 S3 + \varepsilon$.

The REG Procedure
Dependent Variable: TSALES

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	1457.35701	291.47140	50.39	<.0001
Error	42	242.95549	5.78465		
Corrected Total	47	1700.31250			

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	0.13618	3.83130	0.04	0.9718
PRICE	1	−0.00480	0.05486	−0.09	0.9307
NSTORE	1	0.18062	0.03268	5.53	<.0001
S1	1	−8.63619	0.98429	−8.77	<.0001
S2	1	−8.85509	0.98339	−9.00	<.0001
S3	1	1.90379	0.98310	1.94	0.0596

(a) Obtain the coefficient of determination and interpret its meaning. (5%)
(b) Estimate the mean of the total sales for the 26th period (i.e. the second season in the 7th year) with PRICE = 55 and NSTORE = 143. (5%)
(c) Interpret the meaning of the estimated regression coefficients (the values underlined above). (10%)
(d) Set $\alpha = 0.05$. The p-values for 'intercept', 'PRICE' and 'S3' are greater than 0.05. Will you delete intercept, PRICE and S3 from the model? Justify your answer. (5%)

接背面

試題隨卷繳交

2. Two plans (A and B) are proposed to a community rebuilding project. Let p_A be the proportion of residents who prefer plan A and p_B be the proportion of residents who prefer plan B. To test H_0: $p_A = p_B$ vs. H_1: $p_A \neq p_B$ with $\alpha = 0.10$, a random sample of n residents will be selected. Let $X_i = 1$ if the i^{th} selected resident prefers A and $X_i = 0$ if the i^{th} selected resident prefers B.

   (a) Let n = 10 and use $\sum_{i=1}^{10} X_i$ as the test statistic.

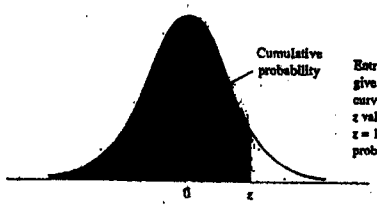
   (i) Write down the probability distribution of the test statistic under H_0 and specify the value(s) of parameter(s) of the probability distribution. (3%)

   (ii) If the sample value of the test statistic is 6, obtain the p-value of the test and write down your conclusion. (8%)

   (b) Let n = 100 and $\hat{p}_A = 0.6, \hat{p}_B = 0.4$. Conduct the test by the test of Goodness of Fit. (10%)

   (c) Compare the test results of (a) and (b). Give comments. (4%)

CUMULATIVE PROBABILITIES FOR THE STANDARD NORMAL DISTRIBUTION



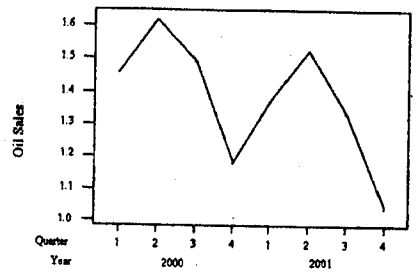
Entries in the table give the area under the curve to the left of the z value. For example, for z = 1.25 the cumulative probability is .8944.

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9913
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	.9986	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990

接下頁

試題隨卷繳交

3. The plot below gives quarterly auto sales (in millions) for the first quarter of 2000 through the last quarter of 2001.



Using regression software, the estimated linear trend model was fit to the data. For each observation the actual sales and predicted sales was computed, and these are provided as part of the table below.

Year	Quarter	Sales	Predicted
2000	1	1.46212	1.55023
2000	2	1.62066	1.50203
2000	3	1.49914	1.45383
2000	4	1.1839	1.40563
2001	1	1.37513	1.35743
2001	2	1.52615	1.30924
2001	3	1.33953	1.26104
2001	4	1.04564	1.21284

(a) What is the seasonality factor for the second quarter? (10%)

(b) Using regression software the trend –only model for this series is

$$\text{Sales} = 1.60 - 0.0482x$$

The trend-and-season model is

$$\text{Sales} = (1.60 - 0.0482x) \times \text{SF}$$

where x is the number of months elaspsed since the beginning of the series. Using this estimated trend-and-season model, what are the predicted sales for the first quarter of 2002? (10%)

4. Let X and Y have a bivariate normal distribution with parameter $u_x=70$, $\sigma_X^2=100$, $u_Y=80$, $\sigma_Y^2=169$, and correlation $\rho=5/13$. Find the following :

(a) $E(Y|X=72)$ (10%)

(b) $\text{Var}(Y|X=72)$ (10%)

(c) $P(Y \le 81 | X = 72)$ (10%)

試題隨卷繳交