

所別：資訊管理學系碩士班甲乙組 科目：統計學

注意：請依題號順序作答，跳答者扣總分 10 分。

1. (10%) Suppose you are given a data set containing two variables: X and Y . Please compare and contrast the following pair of statistical techniques to be used in terms of when to use and variable characteristics each technique requires.
 - a. (4%) Correlation analysis and regression analysis.
 - b. (3%) t -test and ANOVA analysis.
 - c. (3%) χ^2 statistics and t -test.
2. (25%) Compare and contrast the following four sets of data.
 - a. (3%) Write down the regression equation for data set (a) below.
 - b. (7%) Write down the r^2 for data set (b) below and interpret its meaning.
 - c. (5%) Plot the data set (c) below and draw the regression line.
 - d. (10%) Explain the fact that all four equations have the same slope but very different r^2 's.

Four sets of data

(a)		(b)		(c)		(d)	
X	Y	X	Y	X	Y	X	Y
1	5	1	3	1	3	2	4
1	6	1	9	1	5	2	6
2	6	2	4	1	6	2	7
2	7	2	10	1	9	2	10
3	6	3	4	5	6	3	4
3	8	3	10	5	7	3	6
4	7	4	5	5	10	3	8
4	9	4	12	5	12	3	10
5	7	5	6			4	5
5	10	5	12			4	7
						4	9
						4	12
N :	10	10		8		12	
a :	4.85	5.25		5.00		5.08	
b :	0.75	0.75		0.75		0.75	
r^2 :	0.54	0.10		0.30		0.06	
SS_{reg} :	11.25	11.25		18.00		3.50	
SS_{res} :	9.65	97.25		41.50		66.17	

參考用

3. (10%) Based on past experience, it is assumed that the number of flaws per foot in rolls of grade-2 paper follows a Poisson distribution with an average of 1 flaw per 5 feet of paper (0.2 flaws per foot). What is the probability that in a
 - a. (3%) 1-foot roll there will be at least 2 flaws?
 - b. (3%) 12-foot roll there will be more than 1 flaw?
 - c. (4%) 15-foot roll there will be between 3-5 (inclusive) flaws?
4. (5%) If $n = 4$ and $p = 0.12$, then what is $P(x = 0)$?
5. (10%) 何謂 P-value? P-value 在假說檢定中的意涵及應用為何?
6. (10%) 何謂 Latin Square Design? 為什麼要使用 Latin Square Design? 什麼情況下可以使用 Latin Square Design?
7. (15%) 舉例說明 Cluster Sampling 及 Stratified Random Sampling 的異同處。為加強樣本的代表性，什麼時候應該用 Cluster Sampling? 什麼時候應該用 Stratified Random Sampling?

注意：背面有試題

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8. (15%) 下表為北區、中區、南區的家庭支出（以千元單位計算）樣本，在 0.05 顯著水準下，檢定家庭支出是否因地而異。（ $F_{0.90; 14, 2} = 9.42$, $F_{0.90; 12, 2} = 9.41$, $F_{0.90; 2, 14} = 2.73$, $F_{0.90; 2, 12} = 2.81$, $F_{0.95; 14, 2} = 19.42$, $F_{0.95; 12, 2} = 19.41$, $F_{0.95; 2, 14} = 3.74$, $F_{0.95; 2, 12} = 3.89$ ）

北區	47	49	53	46	50
中區	55	58	54	52	61
南區	54	51	50	49	51

TABLE E. 7
Table of Poisson Probabilities
For a given value of λ , entry indicates the probability of obtaining a specified value of X .

X	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
0	0.9048	0.8187	0.7408	0.6703	0.6065	0.5488	0.4966	0.4493	0.4066	0.3679
1	0.0905	0.1637	0.2222	0.2681	0.3053	0.3293	0.3476	0.3595	0.3659	0.3679
2	0.0045	0.0164	0.0333	0.0536	0.0758	0.0988	0.1217	0.1438	0.1647	0.1839
3	0.0002	0.0011	0.0033	0.0072	0.0126	0.0198	0.0284	0.0383	0.0494	0.0613
4	0.0000	0.0001	0.0003	0.0007	0.0016	0.0030	0.0050	0.0077	0.0111	0.0153
5	0.0000	0.0000	0.0000	0.0001	0.0002	0.0004	0.0007	0.0012	0.0020	0.0031
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0002	0.0003	0.0005
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001

X	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
0	0.3329	0.3012	0.2725	0.2466	0.2231	0.2019	0.1827	0.1653	0.1496	0.1353
1	0.3662	0.3614	0.3543	0.3452	0.3347	0.3230	0.3106	0.2975	0.2842	0.2707
2	0.2014	0.2169	0.2303	0.2417	0.2510	0.2584	0.2640	0.2678	0.2700	0.2707
3	0.0738	0.0867	0.0998	0.1128	0.1255	0.1378	0.1496	0.1607	0.1710	0.1804
4	0.0203	0.0260	0.0324	0.0395	0.0471	0.0551	0.636	0.0723	0.0812	0.0902
5	0.0045	0.0062	0.0084	0.0111	0.0141	0.0176	0.0216	0.0260	0.0309	0.0361
6	0.0008	0.0012	0.0018	0.0026	0.0035	0.0047	0.0061	0.0078	0.0098	0.0120
7	0.0001	0.0002	0.0003	0.0005	0.0008	0.0011	0.0015	0.0020	0.0027	0.0034
8	0.0000	0.0000	0.0001	0.0001	0.0001	0.0002	0.0003	0.0005	0.0006	0.0009
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0002

X	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0
0	0.1225	0.1108	0.1003	0.0907	0.0821	0.0743	0.0672	0.0608	0.0550	0.0498
1	0.2572	0.2438	0.2306	0.2177	0.2052	0.1931	0.1815	0.1703	0.1596	0.1494
2	0.2700	0.2681	0.2652	0.2613	0.2565	0.2510	0.2450	0.2384	0.2314	0.2240
3	0.1890	0.1966	0.2033	0.2090	0.2138	0.2176	0.2205	0.2225	0.2237	0.2240
4	0.0992	0.1082	0.1169	0.1254	0.1336	0.1414	0.1488	0.1557	0.1622	0.1680
5	0.0417	0.0476	0.0538	0.0602	0.0668	0.0735	0.0804	0.0872	0.0940	0.1008
6	0.0146	0.0174	0.0206	0.0241	0.0278	0.0319	0.0362	0.0407	0.0455	0.0504
7	0.0044	0.0055	0.0068	0.0083	0.0099	0.0118	0.0139	0.0163	0.0188	0.0216
8	0.0011	0.0015	0.0019	0.0025	0.0031	0.0038	0.0047	0.0057	0.0068	0.0081
9	0.0003	0.0004	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	0.0022	0.0027
10	0.0001	0.0001	0.0001	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008
11	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0002	0.0002
12	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001

X	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0
0	0.0450	0.0408	0.0369	0.0334	0.0302	0.0273	0.0247	0.0224	0.0202	0.0183
1	0.1397	0.1340	0.1217	0.1135	0.1057	0.0984	0.0915	0.0850	0.0789	0.0733
2	0.2165	0.2087	0.2008	0.1929	0.1850	0.1771	0.1692	0.1615	0.1539	0.1465
3	0.2237	0.2226	0.2209	0.2186	0.2158	0.2125	0.2087	0.2046	0.2001	0.1954
4	0.1734	0.1781	0.1823	0.1858	0.1888	0.1912	0.1931	0.1944	0.1951	0.1954
5	0.1075	0.1140	0.1203	0.1264	0.1322	0.1377	0.1429	0.1477	0.1522	0.1563
6	0.0555	0.0608	0.0662	0.0716	0.0771	0.0826	0.0881	0.0936	0.0989	0.1042
7	0.0246	0.0278	0.0312	0.0348	0.0385	0.0425	0.0466	0.0508	0.0551	0.0595
8	0.0095	0.0111	0.0129	0.0148	0.0169	0.0191	0.0215	0.0241	0.0269	0.0298
9	0.0033	0.0040	0.0047	0.0056	0.0066	0.0076	0.0089	0.0102	0.0116	0.0132

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