



國立臺灣海洋大學一〇〇學年度研究所碩士班暨碩士在職專班入學考試試題

考試科目：統計學

系所名稱：海洋事務與資源管理研究所碩士班甲組

※可使用計算器

1.答案以橫式由左至右書寫。2.請依題號順序作答。

第一部份(50%，共3題)

Please explain the following terms: (20%)

- (a) Residuals
- (b) Unbiased estimator
- (c) Coefficient of determination
- (d) Paired t-test
- (e) Two-way ANOVA

Sixteen athletes of about equal height and weight were divided randomly into four groups of four individuals. Each group participated in a special exercise program for different lengths of time. The loss in body weight (pound) and length of time (day) are as following table. Please (1) estimate the parameters of simple linear regression, (2) test whether the relation between body loss and exercise time length is linear? ($\alpha=0.05$) (write the null and alternate hypotheses, construct the ANOVA table, and write down your conclusion) (3) calculate the coefficient of determination. (20%)

Length of Time	Weight loss	Length of Time	Weight loss
15	4	45	30
15	8	45	26
15	10	45	28
15	6	45	25
30	18	60	32
30	15	60	35
30	18	60	36
30	21	60	37

A fishery biologist used three antibiotics to treat the disease of tilapia (each treatment for 100 individuals) and the results are as follows. Please test whether these three antibiotics have the same effect ($\alpha=0.01$) (10%)

	Survivor	Death	Sum
A	32	68	100
B	60	40	100
C	48	52	100

$$X^2_{0.01,1}=6.64, X^2_{0.01,2}=9.21, F_{3,12;0.05(1)}=8.74, F_{3,12;0.05(2)}=14.3$$

第二部份、計算題(50%，共 3 題)

1. 某研究生丟擲一枚均勻銅板 50 次，請問：

(1) 其出現 20 次正面的機率為何？(5 分)

(2) 其出現正面的次數超過 20 次 但少於 30 次的機率為何？(10 分)

2. 若想要瞭解國人男女與每週水產品食用是否有關，隨機調查 60 人，得知結果如下：(15 分)

性別	超過 20 公克	低於 20 公克
男	10	18
女	18	14

試在 $\alpha = 0.01$ 下，以卡方檢定及 Z 檢定計算之。 $\chi^2_{0.01}(1) = 6.6349$ $Z_{0.005} = 2.575$

3. 某水產品公司原以店面銷售模式經營，現透過網路平台開拓客源，以下的資料是平台開始營運前 8 個月以及平台營運後 10 個月的月營收資料。(單位：元)

營運前	3755	4250	4171	4685	4352	4096	3937	3889		
營運後	4958	4763	5152	4871	5368	5490	5125	5037	5396	4791

(1) 請問在 5% 顯著水準下，該水產品公司的網路平台的經營是否有提高營業額？(10 分)

(2) 若其營收的 25% 為利潤，該水產公司是否值得每月支出 50 元的平台維運成本？(10 分)

$$F_{0.025}(7,9) = 4.20 \quad t_{0.05}(16) = 1.746$$

常態分配表

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.2549
0.7	0.2580	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2967	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990
3.1	0.4990	0.4991	0.4991	0.4991	0.4992	0.4992	0.4992	0.4992	0.4993	0.4993
3.2	0.4993	0.4993	0.4994	0.4994	0.4994	0.4994	0.4994	0.4995	0.4995	0.4995
3.3	0.4995	0.4995	0.4995	0.4996	0.4996	0.4996	0.4996	0.4996	0.4996	0.4997
3.4	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4998
3.5	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998

