

1. 有一二因子的實驗設計，兩個因子為輪胎的種類與輪胎的胎壓的大小。胎壓的大小分成過多、適中及過低。將記錄汽車開駛 10000 公里之後輪胎的磨損情況。每個實驗組合將重複作四次。部分的 ANOVA 表如下：

Source	df	SS	MS	F
輪胎的種類	2		8.361	
胎壓的大小				
交互作用			4.102	
誤差		110.75		
總和		420.972		

(1) 試完成此表。(12分)

(2) 在顯著水準 0.05 之下，是否輪胎的種類會有顯著的差異？(5分)

2. 下列幾家航空公司其航班會準時到達的百分比約為 70% 至 80%。從各家航空公司隨機抽取 50 班航次其準時到達的班次如下。在顯著水準 0.10 之下，各家航空公司對航班會準時到達此事件是否有一致性？(12分)

準時到達的班次次數

A	35
B	31
C	45
D	38
E	33

3. 假設  $X$  的動差母函數為  $M(t) = \frac{1}{(1-t)^2}$ ， $t < 1$ 。求  $E(X^3)$  及變異數各為何？(7·7分)

4. 若有一複迴歸的模式為  $Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + e_i$  且其資料如下表。試求  $\hat{\beta}_0 + \hat{\beta}_1 + \hat{\beta}_2$  之值為何？(15分)

Y	1	2	3	4
$X_1$	-1	1	-1	1
$X_2$	-1	-1	1	1

5. 通常為比薩餅佐料的美國鯉魚，其長度是服從近似常態分配的。此分配的平均數  $\mu = 10.2$  公分，標準差  $\sigma = 0.68$  公分。求下列鯉魚長度的百分比。

(a) 9.0 公分以下。(5分)

(b) 預期最長的 15% 鯉魚是在何值以上？(5分)

(c) 預期中間 99% 長度的鯉魚是介於何值之間？(5分)

(背面仍有題目,請繼續作答)

6. 解釋下列問題：(每小題 3 分)

1. type II error (型二誤差)
2. finite population correction (有限母體修正數)
3. p-value (p 值)
4. maximum error (最大誤差)
5. hypothesis (假設)

7.  $\bar{X}$  是從一常態分配其變異數是 9 所得的樣本平均數。檢定  $H_0: \mu = 100$  vs  $H_1: \mu > 100$ 。  
在顯著水準 0.05 之下，滿足當  $\mu = 101$  時其檢定力為 0.5 最小樣本數為何？(12 分)

附表：

$$t_{7,0.025} = 2.365, t_{7,0.05} = 1.895, t_{7,0.1} = 1.415, F_{2,26,0.025} = 4.27, F_{2,27,0.025} = 4.24, F_{2,28,0.025} = 4.22,$$

$$F_{2,26,0.05} = 3.37, F_{2,27,0.05} = 3.35, F_{2,28,0.05} = 3.34, \chi^2_{5,0.1} = 9.2364, \chi^2_{4,0.1} = 7.7794,$$

$$\chi^2_{3,0.1} = 6.2514, \chi^2_{5,0.05} = 11.0705, \chi^2_{4,0.05} = 9.4877, \chi^2_{3,0.05} = 7.8147.$$

表中的數值代表介於平均數與 z 之間的面積

標準常態分配表：

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2518	.2549
.7	.2580	.2612	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4986	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990