

統計學 試題 (限用答案本作答)

可使用計算機

一. (選擇題, 每小題2分) 某班有80人, 這學期統計學期中考成績經由 Excel 計算後, 得到下列結果:

欄1	
平均數	76
標準誤	
中間值	72
眾數	70
標準差	8
變異數	
峰度	3.3565
偏態	0.9276
範圍	36
最小值	
最大值	96
總和	
個數	80

- 最多人得到何種分數?  
 (1) 70 (2) 72 (3) 74 (4) 78 (5) 其它
- 大約有多少人及格 (60分或60分以上)?  
 (1) 50 (2) 60 (3) 70 (4) 80 (5) 其它
- 實際上有百分之多少的同學, 成績落在平均數加減三倍標準差之間?  
 (1) 68.26 (2) 95.44 (3) 99.74 (4) 100 (5) 其它
- 假設成績分配是單峰分配, 下列敘述何者較恰當?  
 (1) 成績分配是對稱分配 (2) 成績分配的長尾向右 (3) 成績分配的長尾向左
- 假設成績分配是單峰分配, 下列敘述何者較可能?  
 (1) 成績分配是常態峰 (2) 成績分配是高狹峰 (3) 成績分配是低闊峰

二. 假設這學期全校大一學生經濟學期中考的成績分配為常態分配, 平均分數為65分, 標準差為10分.

- 經濟系主任想要頒獎給成績在前5%的學生, 試問獲獎同學的最低分數為多少分? (5分)
- 經濟系的老師很熱心的要幫助期中考成績不理想的同學, 預計輔導成績較差的10%同學, 試問經濟學期中考成績低於幾分就要接受輔導? (5分)

三. 某機場所用的旅客行李檢查儀器, 可以查出95%有問題的行李, 但2%沒有問題的行李會被它誤認為有問題. 假設平常旅客出境所攜帶的行李中1%有問題, 試問被這套儀器顯示有問題的行李它本身的確如此的機率是多少?(10分)

四. 某製造公司為研究不良品的出現頻率, 隨機抽驗150箱產品 (每箱產品個數均為100個), 發現有23箱沒有不良品, 39箱含一個不良品, 43箱含兩個不良品, 23箱含三個不良品, 10箱含四個不良品, 7箱含五個不良品, 4箱含六個不良品, 1箱含七個不良品. 試取顯著水準 $\alpha = 0.05$ , 以檢定一箱產品中不良品的個數是否會呈波氏分配 (Poisson distribution). (10分)

五. 假設某部機器發生故障次數的機率分配近似波氏分配 (Poisson distribution), 且平均每40小時故障2次. 試問前後相鄰兩次發生故障的間隔時間不超過24小時的機率為多少?(10分)

六. 文山中學為了解該校學生的平均身高 $\mu$ , 隨機從全校學生中抽出64位同學, 結果這64位同學的平均身高為164公分, 標準差為4公分. (假設該校學生人數眾多, 可視為無限母體)

- 試取顯著水準 $\alpha=0.05$ , 以檢定該校學生的平均身高是否超過163公分?(註: 虛無假設 $H_0: \mu \leq 163$ ) (10分)
- 試計算 p-值 (p-value). (5分)
- 若實際上全校學生的平均身高為166公分, 試求此檢定的檢定力 (power) 為多少? (5分)

統計學 試題

(限用答案本作答)

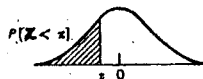
七. 以下的資料是由X和Y兩個變數所得到的5個觀察值

觀察值	1	2	3	4	5
$X_i$	2	3	5	2	8
$Y_i$	20	25	20	30	15

1. 假設兩者之間有線性關係, 試利用最小平方求迴歸方程式  $\hat{y} = \hat{\beta}_0 + \hat{\beta}_1 x$ . (不必推導公式, 但沒有計算過程不給分) (5分)
2. 試取顯著水準  $\alpha = 0.05$ , 以檢定  $\beta_1$  是否為 0. (10分)
3. 試求當  $x = 6$  時, Y 的期望值的 95% 信賴區間. (5分)

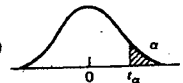
八. 對一非負隨機變數 X, 試證  $(EX)^{\frac{1}{2}} \geq EX^{\frac{1}{2}}$ . (註: EX 表示 X 的期望值) (10分)

標準常態分配值



z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.5	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002
-3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003
-3.3	.0005	.0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.0003
-3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0005	.0005	.0005	.0005
-3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	.0008	.0007	.0007
-3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
-2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	.0014	.0014
-2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.0026
-2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0036
-2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	.0049	.0048
-2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	.0066	.0064
-2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.0084
-2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
-2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
-2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
-1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
-1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
-1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
-1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.0455
-1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559
-1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681
-1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
-1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
-1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
-1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
-.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
-.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
-.7	.2420	.2389	.2358	.2327	.2297	.2266	.2236	.2206	.2177	.2148
-.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
-.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
-.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
-.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
-.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
-.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247
0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641

t-分配右尾百分點  $t_{\alpha}(d.f.)$



d.f.	.25	.1	.05	.025	.01	.005
1	1.000	3.078	6.314	12.706	31.821	63.657
2	.816	1.886	2.920	4.303	6.965	9.925
3	.765	1.638	2.353	3.182	4.541	5.841
4	.741	1.533	2.132	2.776	3.747	4.684
5	.727	1.476	2.015	2.571	3.365	4.032
6	.718	1.440	1.943	2.447	3.143	3.707
7	.711	1.415	1.895	2.365	2.998	3.499
8	.706	1.397	1.860	2.306	2.896	3.355
9	.703	1.383	1.833	2.262	2.821	3.250
10	.700	1.372	1.812	2.228	2.764	3.169
11	.697	1.363	1.796	2.201	2.718	3.106
12	.695	1.356	1.782	2.179	2.681	3.055
13	.694	1.350	1.771	2.160	2.650	3.012
14	.692	1.345	1.761	2.145	2.624	2.977
15	.691	1.341	1.753	2.131	2.602	2.947
16	.690	1.337	1.746	2.120	2.583	2.921
17	.689	1.333	1.740	2.110	2.567	2.898
18	.688	1.330	1.734	2.101	2.552	2.878
19	.688	1.328	1.729	2.093	2.539	2.861
20	.687	1.325	1.725	2.086	2.528	2.845
21	.686	1.323	1.721	2.080	2.518	2.831
22	.686	1.321	1.717	2.074	2.508	2.819
23	.685	1.319	1.714	2.069	2.500	2.807
24	.685	1.318	1.711	2.064	2.492	2.797
25	.684	1.316	1.708	2.060	2.485	2.787
26	.684	1.315	1.706	2.056	2.479	2.779
27	.684	1.314	1.703	2.052	2.473	2.771
28	.683	1.313	1.701	2.048	2.467	2.763
29	.683	1.311	1.699	2.045	2.462	2.756
30	.683	1.310	1.697	2.042	2.457	2.750
40	.681	1.303	1.684	2.021	2.423	2.704
60	.679	1.296	1.671	2.000	2.390	2.660
120	.677	1.289	1.658	1.980	2.358	2.617
∞	.674	1.282	1.645	1.960	2.326	2.576

$\chi^2$ -分配右尾百分點  $\chi^2_{\alpha}(d.f.)$



d.f.	.995	.990	.975	.950	.050	.025	.010	.005
1	$392704 \times 10^{-10}$	$157088 \times 10^{-9}$	$982069 \times 10^{-9}$	$393214 \times 10^{-8}$	3.84146	5.02389	6.63490	7.87944
2	.0100251	.0201007	.0506356	.102587	5.99147	7.37776	9.21034	10.5966
3	.0717212	.114832	.215795	.351846	7.81473	9.34840	11.3449	12.8381
4	.206990	.297110	.484419	.710721	9.48773	11.1433	13.2767	14.8602
5	.411740	.554300	.831211	1.145476	11.0705	12.8325	15.0863	16.7496
6	.675727	.872085	1.237347	1.63539	12.5916	14.4494	16.8119	18.5476
7	.989265	1.239043	1.68987	2.16735	14.0671	16.0128	18.4753	20.2777
8	1.344419	1.646482	2.17973	2.73264	15.5073	17.5346	20.0902	21.9550
9	1.734926	2.087912	2.70039	3.32511	16.9190	19.0228	21.6660	23.5893
10	2.15585	2.55821	3.24697	3.94030	18.3070	20.4831	23.2093	25.1882
11	2.60321	3.05347	3.81575	4.57481	19.6751	21.9200	24.7250	26.7569
12	3.07382	3.57056	4.40379	5.22603	21.0261	23.3367	26.2170	28.2995

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試題完