

- 一. (25%) 下表所列為某地之空氣中含有鉛之濃度觀測值 ( $\mu\text{g}/\text{l}$ ), 請計算下列項目: (1) 樣本之平均值及標準差 (根據表中 20 個樣本)
- (1) 試推求母體平均值及標準差之 95% 信賴度下雙信賴區間;
  - (2) 若此信賴區間欲再縮小 10%, 則需增加多少個樣本。

樣本序號	1	2	3	4	5	6	7	8	9	10
濃度	1.17	1.79	5.62	1.13	3.19	1.73	2.07	2.75	1.20	1.01
樣本序號	11	12	13	14	15	16	17	18	19	20
濃度	1.64	1.57	1.54	2.09	3.54	1.17	1.15	2.57	3.57	1.16

- 二. (25%) 考慮一個複合機率密度函數  $X = 3X_1 + 4X_2 + 2X_3$ , 其中
- $$f_{X_1}(x) = \binom{6}{x} \left(\frac{1}{3}\right)^x \left(\frac{2}{3}\right)^{6-x} \quad x=0, \dots, 6$$
- $$f_{X_2}(x) = \frac{e^{-4} 4^x}{x!} \quad x=0, 1, 2, \dots$$
- $$f_{X_3}(x) = 5e^{-5x} \quad x > 0$$

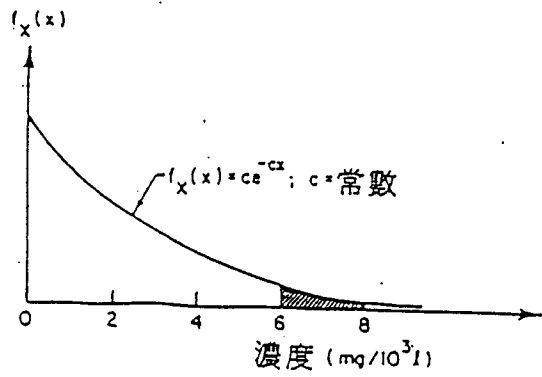
- (1) 求  $E(5X) = ?$
- (2) 求  $\text{Var}(5X) = ?$

- 三. (25%) 河川內某種污染物每日之濃度成指數分佈, 如下圖所示(下頁)

- (1) 假設污染物每天平均的濃度為 2 克/ $10^3$  升, 試求出指數分佈中常數  $C$  值?
- (2) 假設污染物濃度超過 6 克/ $10^3$  升就會發生污染問題, 則每天會發生污染問題之機率為若干?
- (3) 假設任何兩天之污染物濃度彼此為相互獨立之隨機事件, 問污染物濃度達到 6 克/ $10^3$  升之迴歸期為几天?
- (4) 問在未來三天中污染物造成污染問題至多只有一次之機率為若干?
- (5) 假設用常態分佈來代替此指數分佈, 但平均值與方差不變, 則每天發生污染問題之機率為若干?

- 四 (25%) 在多項线性迴歸分析中, 試解釋以下項目:

- (1)  $R^2$  及  $\bar{R}^2$ ; (2) heteroscedasticity (異質性);
- (3) multi collinearity (共线性); (4) F value; (5) t-ratio.

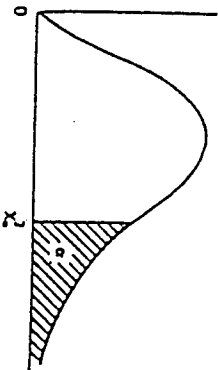


常態曲線之面積



$z$	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5518	0.5558	0.5598	0.5638	0.5677	0.5717	0.5757
0.2	0.5797	0.5837	0.5877	0.5917	0.5957	0.5997	0.6037	0.6077	0.6117	0.6157
0.3	0.6197	0.6237	0.6277	0.6317	0.6357	0.6397	0.6437	0.6477	0.6517	0.6557
0.4	0.6597	0.6637	0.6677	0.6717	0.6757	0.6797	0.6837	0.6877	0.6917	0.6957
0.5	0.6997	0.7037	0.7077	0.7117	0.7157	0.7197	0.7237	0.7277	0.7317	0.7357
0.6	0.7397	0.7437	0.7477	0.7517	0.7557	0.7597	0.7637	0.7677	0.7717	0.7757
0.7	0.7797	0.7837	0.7877	0.7917	0.7957	0.7997	0.8037	0.8077	0.8117	0.8157
0.8	0.8197	0.8237	0.8277	0.8317	0.8357	0.8397	0.8437	0.8477	0.8517	0.8557
0.9	0.8597	0.8637	0.8677	0.8717	0.8757	0.8797	0.8837	0.8877	0.8917	0.8957
1.0	0.8997	0.9037	0.9077	0.9117	0.9157	0.9197	0.9237	0.9277	0.9317	0.9357
1.1	0.9397	0.9437	0.9477	0.9517	0.9557	0.9597	0.9637	0.9677	0.9717	0.9757
1.2	0.9797	0.9837	0.9877	0.9917	0.9957	0.9997	1.0000	1.0000	1.0000	1.0000

$\chi^2$  分配之臨界值



$\nu$	0.995	0.99	0.975	0.95	0.05	0.025	0.01	0.005
1	0.00393	0.0157	0.02982	0.05393	3.841	5.024	6.635	7.879
2	0.0100	0.0201	0.0506	0.103	5.991	7.378	9.210	10.597
3	0.0717	0.115	0.216	0.352	7.815	9.348	11.345	12.838
4	0.207	0.297	0.484	0.711	9.488	11.143	13.277	14.860
5	0.412	0.534	0.831	1.145	11.070	12.832	15.086	16.750
6	0.676	0.872	1.237	1.635	12.592	14.449	16.812	18.548
7	0.989	1.239	1.690	2.167	14.067	16.013	18.475	20.278
8	1.344	1.646	2.180	2.733	15.507	17.535	20.090	21.955
9	1.735	2.088	2.700	3.325	16.919	19.023	21.666	23.589
10	2.156	2.538	3.247	3.940	18.307	20.483	23.209	25.188
11	2.603	3.053	3.816	4.575	19.675	21.920	24.725	26.757
12	3.074	3.571	4.404	5.226	21.026	23.337	26.217	28.300
13	3.565	4.107	5.009	5.892	22.362	24.736	27.688	29.819
14	4.075	4.660	5.679	6.571	23.685	26.119	29.141	31.319
15	4.601	5.229	6.262	7.261	24.996	27.488	30.578	32.801
16	5.142	5.812	6.908	7.962	26.296	28.845	32.000	34.267
17	5.697	6.408	7.564	8.672	27.587	30.191	33.409	35.718
18	6.265	7.015	8.231	9.390	28.869	31.526	34.805	37.156
19	6.844	7.633	8.907	10.117	30.144	32.852	36.191	38.582
20	7.434	8.260	9.591	10.851	31.410	34.170	37.566	39.997
21	8.034	8.897	10.283	11.591	32.671	35.479	38.932	41.401
22	8.643	9.542	10.982	12.338	33.924	36.781	40.289	42.796
23	9.260	10.196	11.689	13.091	35.172	38.076	41.638	44.181
24	9.886	10.856	12.401	13.848	36.415	39.364	42.980	45.558
25	10.520	11.524	13.120	14.611	37.652	40.646	44.314	46.928
26	11.160	12.198	13.844	15.379	38.885	41.923	45.642	48.290
27	11.808	12.879	14.573	16.151	40.113	43.194	46.963	49.645
28	12.461	13.565	15.308	16.928	41.337	44.461	48.278	50.993
29	13.121	14.256	16.047	17.708	42.557	45.722	49.588	52.336
30	13.787	14.953	16.791	18.493	43.773	46.979	50.892	53.672