

1. A sample of wires coming off the production line was tested for tensile strength. The statistical results (in PSI) were the following:

Arithmetic mean	450	Quartile deviation	25
Median	450	Mean deviation	30
Mode	450	Range	180
Variance	900	Sample Size	120

According to the Empirical rule, the middle 95% of the wires tested had a tensile strength between approximately what two values? (5 points)

2. The credit department of a department store reported that 20% of their sales are cash, 50% are paid with a credit card, and 30% with a debit card. Forty percent of the cash purchases, 80% of the credit card purchases, and 70% of the debit card purchases are for more than NT\$5,000. Mr. Ronald Chou just purchased a new suit that cost NT\$15,000. What is the probability that he paid with a credit card? (10 points)
3. Assume a binomial probability distribution with  $n = 60$  and the probability of a success  $p = 0.3$ .
- Find the mean and standard deviation of the random variables. (2 and 3 points, respectively)
  - What is the theoretically meaning of the mean obtained in "question a." (5 points)
  - Find the probability that  $x$  is 15 or more. (10 points).
4. Higher pressurization permits a closer-to-normal environment in an airline cabin and a more relaxed flight. A study by an airline user group recorded the corresponding air pressure on 25 randomly chosen flights. The study revealed a mean equivalent pressure of 7,000 feet with a stand deviation of 200 feet.
- Develop a 95% confidence interval for the population mean equivalent pressure. (10 points)
  - How large a sample is needed to find the population mean within 25 feet at 95% confidence. (5 points)

見背面

5. 由公司過去營運的經驗中得知，一個加油站的年營業額會受到該商圈的人口數及其交通流量的影響。研究人員將公司目前旗下的九個加油站的資料彙整如下：

加油站編號	年營業額(Y) (百萬元/年)	商圈人口數(X1) (千人)	交通流量(X2) (千車次/日)
1	20.66	202	27
2	26.23	253	31
3	29.84	272	39
4	26.91	267	42
5	31.46	301	50
6	24.91	244	33
7	28.47	263	36
8	23.89	224	29
9	25.60	211	25

經由迴歸分析，研究人員得到三個估計結果如下：

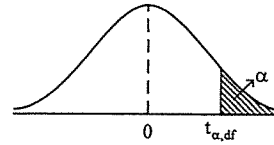
	模型一			模型二			模型三		
	係數	標準誤	t 值	係數	標準誤	t 值	係數	標準誤	t 值
截距	3.33	3.99	0.84	15.02	3.18	4.72	-0.68	6.17	-0.11
商圈人口數	0.09	0.02	5.83				0.13	0.05	2.74
交通流量				0.33	0.09	3.67	-0.17	0.19	-0.86
R 平方	0.83			0.66			0.85		
F	34.02			13.50			16.76		

- 請解讀模型一及模型二的結果(包含模型及係數統計顯著性及其管理意涵)。(5分)
- 請解讀模型三的結果(包含模型及係數統計顯著性及其管理意涵)。(5分)
- 請說明為何「交通流量」在模型二與模型三的符號不一致?(10分)
- 迴歸模型的殘差分析除了用來協助判定模型配適度之外，如何協助管理者作為經營績效的考核?(5分)
- 請問你會以哪一個模型的殘差，作為經營績效的考核?為什麼?(10分)
- 根據你所選擇的模型計算出殘差之後，找出經營績效最好及最差的加油站。(10分)
- 如果被你評定績效差的加油站站長申訴說：由於本站只有一條車道、二個加油幫浦，使得服務速度減緩，經常形成排隊現象，才造成營業額低於平均水準。請為你如何改善或調整你的迴歸模型?(5分)

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t 分配臨界值表

$$P(t_{df} > t_{\alpha, df}) = \alpha$$



df	$\alpha$											
	0.25	0.20	0.15	0.10	0.05	0.025	0.02	0.01	0.005	0.0025	0.001	0.0005
1	1.000	1.376	1.963	3.078	6.314	12.710	15.890	31.820	63.660	127.30	318.30	636.60
2	0.816	1.061	1.386	1.886	2.920	4.303	4.849	6.965	9.925	14.090	22.330	31.600
3	0.765	0.978	1.250	1.638	2.353	3.182	3.482	4.541	5.841	7.453	10.210	12.920
4	0.741	0.941	1.190	1.533	2.132	2.776	2.999	3.747	4.604	5.598	7.173	8.610
5	0.727	0.920	1.156	1.476	2.015	2.571	2.757	3.365	4.032	4.773	5.893	6.869
6	0.718	0.906	1.134	1.440	1.943	2.447	2.612	3.143	3.707	4.317	5.208	5.959
7	0.711	0.896	1.119	1.415	1.895	2.365	2.517	2.998	3.499	4.029	4.785	5.408
8	0.706	0.889	1.108	1.397	1.860	2.306	2.449	2.896	3.355	3.833	4.501	5.041
9	0.703	0.883	1.100	1.383	1.833	2.262	2.398	2.821	3.250	3.690	4.297	4.781
10	0.700	0.879	1.093	1.372	1.812	2.228	2.359	2.764	3.169	3.581	4.144	4.587
11	0.697	0.876	1.088	1.363	1.796	2.201	2.328	2.718	3.106	3.497	4.025	4.437
12	0.695	0.873	1.083	1.356	1.782	2.179	2.303	2.681	3.055	3.428	3.930	4.318
13	0.694	0.870	1.079	1.350	1.771	2.160	2.282	2.650	3.012	3.372	3.852	4.221
14	0.692	0.868	1.076	1.345	1.761	2.145	2.264	2.624	2.977	3.326	3.787	4.140
15	0.691	0.866	1.074	1.341	1.753	2.131	2.249	2.602	2.947	3.286	3.733	4.073
16	0.690	0.865	1.071	1.337	1.746	2.120	2.235	2.583	2.921	3.252	3.686	4.015
17	0.689	0.863	1.069	1.333	1.740	2.110	2.224	2.567	2.898	3.222	3.646	3.965
18	0.688	0.862	1.067	1.330	1.734	2.101	2.214	2.552	2.878	3.197	3.611	3.922
19	0.688	0.861	1.066	1.328	1.729	2.093	2.205	2.539	2.861	3.174	3.579	3.883
20	0.687	0.860	1.064	1.325	1.725	2.086	2.197	2.528	2.845	3.153	3.552	3.850
21	0.686	0.859	1.063	1.323	1.721	2.080	2.189	2.518	2.831	3.135	3.527	3.819
22	0.686	0.858	1.061	1.321	1.717	2.074	2.183	2.508	2.819	3.119	3.505	3.792
23	0.685	0.858	1.060	1.319	1.714	2.069	2.177	2.500	2.807	3.104	3.485	3.768
24	0.685	0.857	1.059	1.318	1.711	2.064	2.172	2.492	2.797	3.091	3.467	3.745
25	0.684	0.856	1.058	1.316	1.708	2.060	2.167	2.485	2.787	3.078	3.450	3.725
26	0.684	0.856	1.058	1.315	1.706	2.056	2.162	2.479	2.779	3.067	3.435	3.707
27	0.684	0.855	1.057	1.314	1.703	2.052	2.158	2.473	2.771	3.057	3.421	3.690
28	0.683	0.855	1.056	1.313	1.701	2.048	2.154	2.467	2.763	3.047	3.408	3.674
29	0.683	0.854	1.055	1.311	1.699	2.045	2.150	2.462	2.756	3.038	3.396	3.659
30	0.683	0.854	1.055	1.310	1.697	2.042	2.147	2.457	2.750	3.030	3.385	3.646
40	0.681	0.851	1.050	1.303	1.684	2.021	2.123	2.423	2.704	2.971	3.307	3.551
50	0.679	0.849	1.047	1.299	1.676	2.009	2.109	2.403	2.678	2.937	3.261	3.496
60	0.679	0.848	1.045	1.296	1.671	2.000	2.099	2.390	2.660	2.915	3.232	3.460
80	0.678	0.846	1.043	1.292	1.664	1.990	2.088	2.374	2.639	2.887	3.195	3.416
100	0.677	0.845	1.042	1.290	1.660	1.984	2.081	2.364	2.626	2.871	3.174	3.390
1000	0.675	0.842	1.037	1.282	1.646	1.962	2.056	2.330	2.581	2.813	3.098	3.300
$\infty$	0.674	0.841	1.036	1.282	1.645	1.960	2.054	2.326	2.576	2.807	3.091	3.291

試題隨卷繳回