

中原大學 100 學年度碩士班入學考試

3 月 19 日 13:30-15:00

土木工程學系運輸組

誠實是我們珍視的美德，
我們喜愛「拒絕作弊，堅守正直」的你！

科目：工程統計學

(共 3 頁第 1 頁)

■ 可使用計算機，惟僅限不具可程式及多重記憶者

□ 不可使用計算機

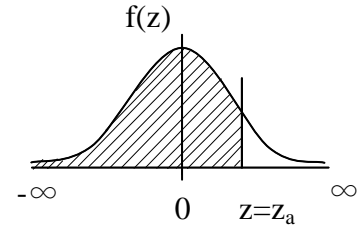
- (20%) X 為常態分配; $X \sim N(\mu = 100.0, \sigma^2 = 25.0)$
 - 求機率 $P(93 < X < 103) = ?$
 - 求機率 $P(X = 100) = ?$
 - 若機率 $P(X < A) = 0.232$, 求 $A = ?$
 - 若機率 $P(X > B) = 0.820$, 求 $B = ?$
- (20%) A sample of 16 data observations has a sample mean of $\bar{X} = 18.8$ and a sample standard deviation $s = 5.5$.
 - Find the value of c for which $\mu \in (c, \infty)$ is a one-sided 99% confidence interval for the population mean μ .
 - Construct a 95% two-sided confidence interval for the population mean.
 - How many additional data observations should be obtained to construct a 99% two-sided confidence interval for the population mean μ with a length no larger than $L_0 = 3.0$?
- (20%) 設甲君投籃命中率 0.4，失敗率 0.6，設每次投籃命中機率均同，且為 Independent. 求
 - 共投 3 球，求投中球數之機率分布？
 - 繪出上小題其機率分配和累積機率分配？
 - 若甲君投中 2 球才結束比賽，問甲君投 4 球之機率？
 - 若甲君投中 1 球就結束比賽，則此種為何種機率分配？其隨機變數(Random variable), X , 如何定義？
 - 上小題 Expected value, $E(X) = ?$ Variance, $VAR(X) = ?$
- (20%) 檢定下列假說：
 $H_0: \mu = 400.0$ versus $H_A: \mu \neq 400.0$ 其 μ 為母體平均值. 取樣本 $n = 20$ 個作檢定: 若 sample mean $\bar{x} = 382.0$,
 - 若 population standard deviation 39.0，以 $\alpha = 0.02$ 作檢定，是否接受 H_0 ?
 - 若 sample standard deviation 39.0，以 $\alpha = 0.02$ 作檢定，是否接受 H_0 ?
 - 若檢定下列假說更改: $H_0: \mu \geq 400.0$ versus $H_A: \mu < 400.0$ ，請重複 (1)(2) 之檢定，是否接受 H_0 ?
- (20%) 簡答題或解釋名詞
 - 何謂 pdf (Probability density function of a continuous random variable X)?
 - 何謂 cdf (Cumulative distribution function of a continuous random variable X)?

- (c) 何謂 Standard normal distribution of a random variable X? (共 3 頁 第 2 頁)
- (d) 何謂 Central limit theorem?
- (e) 何謂 Exponential distribution?

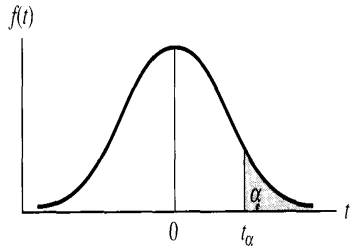
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標準常態分配表

$$F(z) = \int_{-\infty}^z \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}t^2} dt$$



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	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7703	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981



Critical Values for Student's t (共 3 頁 第 3 頁)

ν	$\alpha = .1$	$\alpha = .05$	$\alpha = .025$	$\alpha = .01$	$\alpha = .005$	$\alpha = .001$	$\alpha = .0005$
1	3.0777	6.3531	12.7259	31.8210	63.6606	318.2888	636.5776
2	1.8856	2.9200	4.3027	6.9645	9.9250	22.3285	31.5998
3	1.6377	2.3534	3.1824	4.5407	5.8408	10.2143	12.9244
4	1.5332	2.1318	2.7765	3.7469	4.6041	7.1729	8.6101
5	1.4759	2.0150	2.5706	3.3649	4.0321	5.8935	6.8685
6	1.4398	1.9432	2.4469	3.1427	3.7074	5.2075	5.9587
7	1.4149	1.8946	2.3646	2.9979	3.4995	4.7853	5.4081
8	1.3968	1.8595	2.3060	2.8965	3.3554	4.5008	5.0414
9	1.3830	1.8331	2.2622	2.8214	3.2498	4.2969	4.7809
10	1.3722	1.8125	2.2281	2.7638	3.1693	4.1437	4.5868
11	1.3634	1.7959	2.2010	2.7181	3.1058	4.0248	4.4369
12	1.3562	1.7823	2.1788	2.6810	3.0545	3.9296	4.3178
13	1.3502	1.7709	2.1604	2.6503	3.0123	3.8520	4.2209
14	1.3450	1.7613	2.1448	2.6245	2.9768	3.7874	4.1403
15	1.3406	1.7531	2.1315	2.6025	2.9467	3.7329	4.0728
16	1.3368	1.7459	2.1199	2.5835	2.9208	3.6861	4.0149
17	1.3334	1.7396	2.1098	2.5669	2.8982	3.6458	3.9651
18	1.3304	1.7341	2.1009	2.5524	2.8784	3.6105	3.9217
19	1.3277	1.7291	2.0930	2.5395	2.8609	3.5793	3.8833
20	1.3253	1.7247	2.0860	2.5280	2.8453	3.5518	3.8496
21	1.3232	1.7207	2.0796	2.5176	2.8314	3.5271	3.8193
22	1.3212	1.7171	2.0739	2.5083	2.8188	3.5050	3.7922
23	1.3195	1.7139	2.0687	2.4999	2.8073	3.4850	3.7676
24	1.3178	1.7109	2.0639	2.4922	2.7970	3.4668	3.7454
25	1.3163	1.7081	2.0595	2.4851	2.7874	3.4502	3.7251
26	1.3150	1.7056	2.0555	2.4786	2.7787	3.4350	3.7067
27	1.3137	1.7033	2.0518	2.4727	2.7707	3.4210	3.6895
28	1.3125	1.7011	2.0484	2.4671	2.7633	3.4082	3.6739
29	1.3114	1.6991	2.0452	2.4620	2.7564	3.3963	3.6595
30	1.3104	1.6973	2.0423	2.4573	2.7500	3.3852	3.6460
40	1.3031	1.6839	2.0211	2.4233	2.7045	3.3069	3.5510
60	1.2958	1.6706	2.0003	2.3901	2.6603	3.2317	3.4602
120	1.2886	1.6576	1.9799	2.3578	2.6174	3.1595	3.3734
∞	1.2816	1.6449	1.9600	2.3264	2.5758	3.0902	3.2905

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