東吳大學 107 學年度碩士班研究生招生考試試題

系級	國際經營與貿易學系碩士班	考試時間	100 分鐘
科目	統計學	本科總分	100 分

計算題

1. Time spent using email per session is normally distributed with $\mu=8$ minutes and $\sigma=2$ minutes. If you select a random sample of 25 sessions, **(10%)**

    (a) what is the probability that the sample mean is between 7.8 and 8.2 minutes? (3%)

    (b) what is the probability that sample mean is between 7.5 and 8 minutes? (3%)

    (c) if you select a random sample of 100 sessions, what is the probability that the sample mean is between 7.8 and 8.2 minutes? (4%)

2. The manager of SCUIB Firm wants to estimate the mean amount spent per shopping visit by customers. A sample of 15 customers reveals the following amounts spent. **(10%)**

$48	42	46	51	23	41	54
37	52	48	50	46	61	61
49						

    (a) What is the best estimate of the population mean? (2%)

    (b) Determine a 95 percent confidence interval. (4%)

    (c) Would it be reasonable to conclude that the population mean is $50? (4%)

3. Suppose the Triump government wants to estimate of proportion of the population who support the current policy toward revisions in the health care system. The government selects 1000 cases by simple random sampling from population. The supporter is 300. Please construct a 95% confidence interval estimate for the proportion of population. And interpret it. **(10%)**

4. If the likelihood of a tagged order form is 0.1, what is the probability that there are three tagged order forms in the sample of four? What is the probability that there are less than three tagged order forms in the sample of four? **(10%)**

5. You are a project manager for the MyLine website, an online service that streams movies and episodes from broadcast and cable TV series and that allows users to upload and share original video. Past data indicate that the mean download time is 7 seconds and that the standard deviation is 2 seconds. What is the probability that the video download time for the MyLine website will more than 9 seconds? What is the probability that video download time for the MyLine website will be between 5 and 9 seconds? **(10%)**

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解釋名詞，請以文字內文為主，可以的話再以其他圖或表補充之 (50%)

1. sampling distribution 抽樣分配 (5%)
2. the standard error of the mean 平均數的標準誤 (5%)
3. Central Limit Theorem 中央極限定理 (5%)
4. confidence interval estimate 信賴區間估計 (5%)
5. sampling error 抽樣誤差 (5%)
6. critical value 關鍵值 (5%)
7. level of confidence 信賴水準 (5%)
8. type I error 型 I 錯誤 (5%)
9. p value p 值 (5%)
10. R^2 決定係數 (5%)

公式

$$P(X = x \mid n, \pi) = \frac{n!}{x!(n-x)!} \pi^x (1-\pi)^{n-x} \qquad \sigma = \sqrt{n\pi(1-\pi)}$$

$$z = \frac{x - \mu}{\sigma} \qquad X = \mu + z\sigma \qquad \sigma_{\overline{X}} = \frac{\sigma}{\sqrt{n}}$$

$$z = \frac{\overline{X} - \mu}{\dfrac{\sigma}{\sqrt{n}}} \qquad \overline{X} = \mu + z\frac{\sigma}{\sqrt{n}} \qquad \sigma_p = \sqrt{\frac{\pi(1-\pi)}{n}}$$

$$z = \frac{p - \pi}{\sqrt{\dfrac{\pi(1-\pi)}{n}}} \qquad \overline{X} - z_{\alpha/2}\frac{\sigma}{\sqrt{n}} \le \mu \le \overline{X} + z_{\alpha/2}\frac{\sigma}{\sqrt{n}}$$
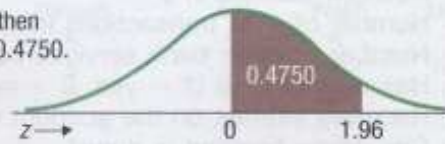
$$t = \frac{\overline{X} - \mu}{\dfrac{S}{\sqrt{n}}} \qquad \overline{X} - t_{\alpha/2}\frac{S}{\sqrt{n}} \le \mu \le \overline{X} + t_{\alpha/2}\frac{S}{\sqrt{n}}$$

$$p - z_{\alpha/2}\sqrt{\frac{p(1-p)}{n}} \le \pi \le p + z_{\alpha/2}\sqrt{\frac{p(1-p)}{n}}$$

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Example:
If $z = 1.96$, then
$P(0 \text{ to } z) = 0.4750$.

0.4750

$z \rightarrow$ 0   1.96

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.2549
0.7	0.2580	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2967	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990

國際經營與貿易學系碩士班

統計學

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t distribution

df	Confidence Intervals, c 80% / α 0.10 / 0.20	90% / 0.05 / 0.10	95% / 0.025 / 0.05	98% / 0.01 / 0.02	99% / 0.005 / 0.01	99.9% / 0.0005 / 0.001	df	80% / 0.10 / 0.20	90% / 0.05 / 0.10	95% / 0.025 / 0.05	98% / 0.01 / 0.02	99% / 0.005 / 0.01	99.9% / 0.0005 / 0.001
1	3.078	6.314	12.706	31.821	63.657	636.619	36	1.306	1.688	2.028	2.434	2.719	3.582
2	1.886	2.920	4.303	6.965	9.925	31.599	37	1.305	1.687	2.026	2.431	2.715	3.574
3	1.638	2.353	3.182	4.541	5.841	12.924	38	1.304	1.686	2.024	2.429	2.712	3.566
4	1.533	2.132	2.776	3.747	4.604	8.610	39	1.304	1.685	2.023	2.426	2.708	3.558
5	1.476	2.015	2.571	3.365	4.032	6.869	40	1.303	1.684	2.021	2.423	2.704	3.551
6	1.440	1.943	2.447	3.143	3.707	5.959	41	1.303	1.683	2.020	2.421	2.701	3.544
7	1.415	1.895	2.365	2.998	3.499	5.408	42	1.302	1.682	2.018	2.418	2.698	3.538
8	1.397	1.860	2.306	2.896	3.355	5.041	43	1.302	1.681	2.017	2.416	2.695	3.532
9	1.383	1.833	2.262	2.821	3.250	4.781	44	1.301	1.680	2.015	2.414	2.692	3.526
10	1.372	1.812	2.228	2.764	3.169	4.587	45	1.301	1.679	2.014	2.412	2.690	3.520
11	1.363	1.796	2.201	2.718	3.106	4.437	46	1.300	1.679	2.013	2.410	2.687	3.515
12	1.356	1.782	2.179	2.681	3.055	4.318	47	1.300	1.678	2.012	2.408	2.685	3.510
13	1.350	1.771	2.160	2.650	3.012	4.221	48	1.299	1.677	2.011	2.407	2.682	3.505
14	1.345	1.761	2.145	2.624	2.977	4.140	49	1.299	1.677	2.010	2.405	2.680	3.500
15	1.341	1.753	2.131	2.602	2.947	4.073	50	1.299	1.676	2.009	2.403	2.678	3.496
16	1.337	1.746	2.120	2.583	2.921	4.015	51	1.298	1.675	2.008	2.402	2.676	3.492
17	1.333	1.740	2.110	2.567	2.898	3.965	52	1.298	1.675	2.007	2.400	2.674	3.488
18	1.330	1.734	2.101	2.552	2.878	3.922	53	1.298	1.674	2.006	2.399	2.672	3.484
19	1.328	1.729	2.093	2.539	2.861	3.883	54	1.297	1.674	2.005	2.397	2.670	3.480
20	1.325	1.725	2.086	2.528	2.845	3.850	55	1.297	1.673	2.004	2.396	2.668	3.476
21	1.323	1.721	2.080	2.518	2.831	3.819	56	1.297	1.673	2.003	2.395	2.667	3.473
22	1.321	1.717	2.074	2.508	2.819	3.792	57	1.297	1.672	2.002	2.394	2.665	3.470
23	1.319	1.714	2.069	2.500	2.807	3.768	58	1.296	1.672	2.002	2.392	2.663	3.466
24	1.318	1.711	2.064	2.492	2.797	3.745	59	1.296	1.671	2.001	2.391	2.662	3.463
25	1.316	1.708	2.060	2.485	2.787	3.725	60	1.296	1.671	2.000	2.390	2.660	3.460
26	1.315	1.706	2.056	2.479	2.779	3.707	61	1.296	1.670	2.000	2.389	2.659	3.457
27	1.314	1.703	2.052	2.473	2.771	3.690	62	1.295	1.670	1.999	2.388	2.657	3.454
28	1.313	1.701	2.048	2.467	2.763	3.674	63	1.295	1.669	1.998	2.387	2.656	3.452
29	1.311	1.699	2.045	2.462	2.756	3.659	64	1.295	1.669	1.998	2.386	2.655	3.449
30	1.310	1.697	2.042	2.457	2.750	3.646	65	1.295	1.669	1.997	2.385	2.654	3.447
31	1.309	1.696	2.040	2.453	2.744	3.633	66	1.295	1.668	1.997	2.384	2.652	3.444
32	1.309	1.694	2.037	2.449	2.738	3.622	67	1.294	1.668	1.996	2.383	2.651	3.442
33	1.308	1.692	2.035	2.445	2.733	3.611	68	1.294	1.668	1.995	2.382	2.650	3.439
34	1.307	1.691	2.032	2.441	2.728	3.601	69	1.294	1.667	1.995	2.382	2.649	3.437
35	1.306	1.690	2.030	2.438	2.724	3.591	70	1.294	1.667	1.994	2.381	2.648	3.435

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