

國立政治大學 110 學年度第 1 學期 小考 (2) 考試命題紙

考試科目：統計學 (一)

開課班別：統計學整合開課

命題教授：吳漢銘

考試日期：12 月 02 日 (四) 16:10-17:00

※准帶項目打「O」，否則打「×」

1. 需加發計算紙或答案紙請在試題內封袋備註。

本試題共 2 頁，印刷份數：108 份

計算機	課本	筆記	字典	手機平板筆電
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2. 為環保節能減碳，試題一律採雙面印刷，如有特殊印製需求，請註記：

備註：注意事項要看!! (範圍：§6.1~§6.3)

O	×	×	×	×
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**注意事項：**(1) 答案卷請寫上姓名及學號。(2) 請按題號順序書寫。(3) 每一題號需置於答案卷最左邊。(4) 中英文作答皆可。(5) 可用鉛筆。(6) 需要計算過程。(7) 同時交回答案卷、題目卷、計算紙。(8) 總分共 100 分。

1. (10%) 名詞解釋：(a) 標準常態機率分佈 (Standard Normal Probability Distribution)，(b) 連續修正項 (Continuity Correction Factor)。

2. (50%) 簡答題：

- (a) 試舉出生活中的二個例子，可以用具有「Uniform Probability Distribution」的隨機變數來描述。
- (b) 試舉出生活中的二個例子，可以用具有「Normal Probability Distribution」的隨機變數來描述。(禁止舉本考卷各題目中使用的例子)
- (c) 一個具有平均數為  $\mu$  及標準差為  $\sigma$  的常態隨機變數  $X$ ，如何將之轉換成標準常態分佈？此轉換的目的 (或用途) 為何？
- (d) 假設一隨機變數  $X$  服從 Binomial Distribution (記做  $X \sim B(n, p)$ )，什麼是「Normal Approximation to the Binomial Distribution」？可以使用此逼近法的先決條件為何？
- (e) 機率分佈 (Probability Distribution) 的重要性 (important role) 為何？

3. (20%) **Gasoline Price.** Suppose that the average price for a gallon of gasoline in the United States is \$3.73 and in Russia is \$3.40. Assume these averages are the population means in the two countries and that the probability distributions are normally distributed with a standard deviation of \$0.25 in the United States and a standard deviation of \$0.20 in Russia.

- (a) What is the probability that a randomly selected gas station in the United States charges less than \$3.50 per gallon?
- (b) What percentage of the gas stations in Russia charge less than \$3.50 per gallon?
- (c) What is the probability that a randomly selected gas station in Russia charged more than the mean price in the United States?

4. (20%) **Rocky Mountain National Park** is a popular park for outdoor recreation activities in Colorado. According to U.S. National Park Service statistics, 46.7% of visitors to Rocky Mountain National Park in 2018 entered through the Beaver Meadows park entrance, 24.3% of visitors entered through the Fall River park entrance, 6.3% of visitors entered through the Grand Lake park entrance, and 22.7% of visitors had no recorded point of entry to the park (U.S. National Park Service website). Consider a random sample of 175 Rocky Mountain National Park visitors.

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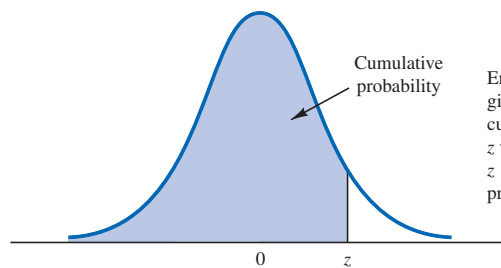
備註：注意事項要看!! (範圍：§6.1~§6.3)

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Use the normal approximation of the binomial distribution to answer the following questions.

- (a) What is the probability that at least 70 but less than 80 visitors had a recorded entry through the Beaver Meadows park entrance?
- (b) What is the probability that fewer than 10 visitors had a recorded entry through the Grand Lake park entrance?
- (c) What is the probability that more than 45 visitors have no recorded point of entry?

**TABLE 1** Cumulative Probabilities for the standard Normal Distribution  
(Continued)



Entries in the table give the area under the curve to the left of the  $z$  value. For example, for  $z = 1.25$ , the cumulative probability is .8944.

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990