共 8 題計算，前 4 題各 10 分，後 4 題各 15 分，共計 100 分。

1. 某路公車自起站至終點站，其行車時間服從常態分配，平均時間為 50 分鐘，變異數為 50，若每 10 分鐘發一班車。問後班車比前一班車早到終點站 5 分鐘之機率為多少（假設各班車之行車時間均獨立）？（10 分）

2. 某甲與某乙以骰子賭博，當骰子出現"2"時，則某甲認輸。在投擲了 150 次之後，某甲共輸 30 次，於是某甲懷疑某乙所用的骰子可能有詐。①請寫出虛無假設與對立假設；（2 分）②在投擲 150 次下，"2" 至少必須出現多少次，某甲方能得到"某乙有詐"的結論。（8 分）（Note: $\alpha = 0.05; \sqrt{\dfrac{(1/6)(5/6)}{150}} = 0.030$ ）

3. A researcher reports survey results by stating that the standard error of the mean (i.e., the standard deviation of the sample mean.) is 10. The population standard deviation is 200. Assume that the data is normally distributed.

   a. How large was the sample used in this survey? （5 points）
   b. What is the probability that the sample mean was within ±15 of the population mean? （5 points）

4. A production process is checked periodically by a quality control inspector. The inspector selects simple random samples of 36 finished products and computes the sample mean product weights $\bar{x}$. If test results over a long period of time show that 2.5% of the $\bar{x}$ values are over 2.5 pounds and 2.5% are under 2.1 pounds, what are the mean and the standard deviation for the population of products produced with this process? Assume that the data is normally distributed. （5 points each）

5. A blackjack player at a Las Vegas casino learned that the house will provide a room if play is for four hours at an average bet of $50. The player's strategy provides a probability of 0.49 of winning on any one hand, and the player knows that there are 60 hands per hour. Suppose the player plays for four hours at a bet of $50 per hand.

   a. What is the player's expected payoff? （5 points）
   b. Suppose the player starts with $1500. What is the probability of going broke? (Hint: Use normal approximation to binomial and $\sqrt{240 \times 0.49 \times 0.51} = 7.74$) （10 points）

（背面仍有題目,請繼續作答）

6. 假設某班學生，其統計學成績呈常態分配，已知這班有 12.3%的學生成績不及格，成績在八十分以上者佔 24.83%。試問這班學生的統計學平均成績、標準差各為多少？（7, 8 分）

7. 已知某產品的廣告支出（以 X 代表）與銷售金額（以 Y 代表）之相關係數為 $r = 0.75$，廣告支出的平均費用為 $\bar{X} =140$ 萬元，標準差 $S_X =20$ 萬元，平均銷售金額 $\bar{Y} =220$ 萬元，標準差 $S_Y =10$ 萬元，$n=50$，試求：①分析前，我們需要對誤差項 ε_i 做那些假設？（5分）②估計 X 對 Y 之直線迴歸方程式 $\hat{Y} = \hat{\alpha} + \hat{\beta} X$？（10 分）

8. 農業署欲比較五種主要蔬菜在十個城市的價格，得結果如下：

變異來源	自由度	平方和	平均平方和	F
蔬菜種類	4			
城市	9		8	
隨機	36		4	
總合	49	312		

① 請寫出這資料變異數分析的理論模型與其誤差項的各項假設。（10分）
② 完成上表。（5分）

TABLE 1 CUMULATIVE PROBABILITIES FOR THE STANDARD NORMAL DISTRIBUTION (*Continued*)

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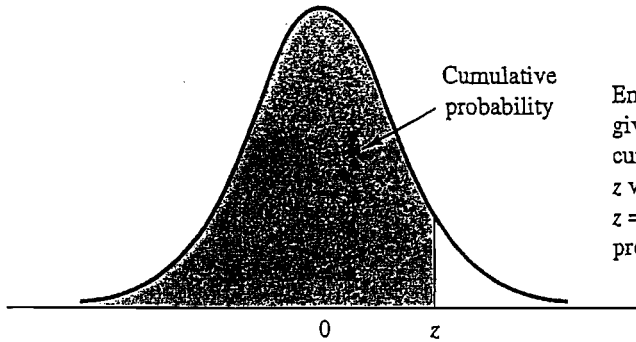
Entries in the table give the area under the curve to the left of the z value. For example, for z = 1.25, the cumulative probability is .8944.

0　　z

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	.9913
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	.9986	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990