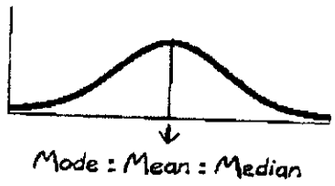
本試題是否可以使用計算機：☑可使用 ，□不可使用 （請命題老師勾選）

1、數據資料的呈現，通常以平均值（mean）、中位數（median）、眾數（mode），討論其集中的情況（three measures of central tendency）。試以頻率分布圖（plot of frequency distribution），圖示並討論平均值、中位數、眾數三者關係。（25%）
例：mode= mean=median



2、變數 $X \sim N(\mu, \sigma^2)$，欲檢測下列之檢定假設

$H_0: \mu \leq \mu_0$　$H_1: \mu > \mu_0$

假設 μ_0=100 及母群體變異數 $\sigma^2=28^2$。抽取 100 個樣本；用 one sample t test 檢定，所得平均值 $\overline{X} \leq 104$ 則接受 $H_0: \mu \leq \mu_0$；所得平均值 $\overline{X} > 104$ 則反對 $H_0: \mu > \mu_0$。計算 type I error（α）假如 μ=100，並計算 type II error（β）假如 μ=110。（20%）

3、數據第一組 $X_{11}, X_{12}, X_{13}, \cdots, X_{1n1}$　第二組 $X_{21}, X_{22}, X_{23}, \cdots, X_{2n2}$ 分別來自兩個獨立母群體變數 X_1 及 X_2，$X_1 \sim N(\mu_1, \sigma^2)$，$X_2 \sim N(\mu_2, \sigma^2)$，各自其中抽取 n_1 及 n_2 個樣本，欲檢測下列之檢定假設

$H_0: \mu_1 = \mu_2$　$H_1: \mu_1 \neq \mu_2$

以 two sample t test 檢定，計算其 test statistic t_0 。

以 Analysis of variance 檢定，計算其 test statistic f_0。

試問 t_0 與 f_0 之關係，下列何者正確，並證明。

（1）$f_0 = 2 * t_0$；（2）$f_0 = t_0/2$；（3）$f_0 = \sqrt{t_0}$；（4）$f_0 = (t_0)^2$；（30%）

4、數據 (x_1, y_1)，(x_2, y_2)，(x_3, y_3)，……，(x_n, y_n)，以線性迴歸模式（linear regression）$Y = a + b*X + \varepsilon$ 來討論該數據。請以最小平方法（least squares method）估算截距（$\hat{a}$）與斜率（$\hat{b}$）。（25%）

（背面仍有題目，請繼續作答）

編號：　445　系所：生理學研究所丙組　　科目：統計學

本試題是否可以使用計算機：☑可使用　，　☐不可使用　（請命題老師勾選）

POSITIVE *z* Scores

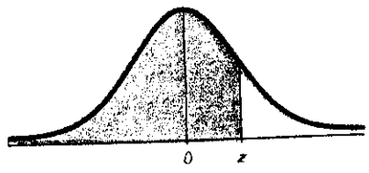


TABLE A-2 (continued) Cumulative Area from the LEFT

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
0.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
0.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
0.9	.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
3.1	.9990	.9991	.9991	.9991	.9992	.9992	.9992	.9992	.9993	.9993
3.2	.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996	.9996	.9996	.9996	.9996	.9997
3.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9998
3.50 and up	.9999									

NOTE. For values of *z* above 3.49, use 0.9999 for the area.

*Use these common values that result from interpolation:

z score	Area
1.645	0.9500
2.575	0.9950

Common Critical Values

Confidence Level	Critical Value
0.90	1.645
0.95	1.96
0.99	2.575