1. Explain the following terms in either English or Chinese: 25%
   ① null hypothesis 5%
   ② Research hypothesis 5%
   ③ Type I error 5%
   ④ Type II error 5%
   ⑤ P-Value 5%

2. Using the formulas provided below to determine a 95% confidence interval for the difference between the two population means on the basis of the difference between the two sample means. Also, explain if a 90% C.I. will be wider? 15%. 10%

	Sample A	Sample B
Sample Size	64	64
Average	88	80
Sample Variance	56	56

C.I. Formula:

$$\bar{y}_1 - \bar{y}_2 \pm t_{\alpha/2} S_p \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}$$

where.

$$S_p = \sqrt{\frac{(n_1-1)S_1^2 + (n_2-1)S_2^2}{n_1+n_2-2}},$$

$$df = n_1 + n_2 - 2$$

3. Consider the following ANOVA table for a three-factor experiment with $n=2$ replications per treatment combination (the effects of all factors are fixed):

Source	df	SS	MS	10% critical value
A	2	43.484	21.742	2.44
B	2	25.602	12.801	2.44
C	3	12.066	4.022	2.23
AB	4	15.376	3.844	2.09
AC	6	45.36	7.56	1.93
BC	6	22.752	3.792	1.93
ABC	12	41.4	3.45	1.91
Error	36	92.232	2.562	

$F = MST/MSE$

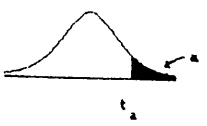
① Test the significance of AB, AC, BC at the $\alpha = 0.10$ level. Are these tests conclusive? Why or why not? 15%

10%

② Are the tests for the main effects of A, B, and C conclusive at the $\alpha = 0.10$ level? Why or why not? 15%

10%

TABLE 4 **Percentage Points of the *t* Distribution**



df	a = .1	a = .05	a = .025	a = .01	a = .005	a = .001
1	3.078	6.314	12.706	31.821	63.657	318.309
2	1.886	2.920	4.303	6.965	9.925	22.327
3	1.638	2.353	3.182	4.541	5.841	10.215
4	1.533	2.132	2.776	3.747	4.604	7.173
5	1.476	2.015	2.571	3.365	4.032	5.893
6	1.440	1.943	2.447	3.143	3.707	5.208
7	1.415	1.895	2.365	2.998	3.499	4.785
8	1.397	1.860	2.306	2.896	3.355	4.501
9	1.383	1.833	2.262	2.821	3.250	4.297
10	1.372	1.812	2.228	2.764	3.169	4.144
11	1.363	1.796	2.201	2.718	3.106	4.025
12	1.356	1.782	2.179	2.681	3.055	3.930
13	1.350	1.771	2.160	2.650	3.012	3.852
14	1.345	1.761	2.145	2.624	2.977	3.787
15	1.341	1.753	2.131	2.602	2.947	3.733
16	1.337	1.746	2.120	2.583	2.921	3.686
17	1.333	1.740	2.110	2.567	2.898	3.646
18	1.330	1.734	2.101	2.552	2.878	3.610
19	1.328	1.729	2.093	2.539	2.861	3.579
20	1.325	1.725	2.086	2.528	2.845	3.552
21	1.323	1.721	2.080	2.518	2.831	3.527
22	1.321	1.717	2.074	2.508	2.819	3.505
23	1.319	1.714	2.069	2.500	2.807	3.485
24	1.318	1.711	2.064	2.492	2.797	3.467
25	1.316	1.708	2.060	2.485	2.787	3.450
26	1.315	1.706	2.056	2.479	2.779	3.435
27	1.314	1.703	2.052	2.473	2.771	3.421
28	1.313	1.701	2.048	2.467	2.763	3.408
29	1.311	1.699	2.045	2.462	2.756	3.396
30	1.310	1.697	2.042	2.457	2.750	3.385
40	1.303	1.684	2.021	2.423	2.704	3.307
60	1.296	1.671	2.000	2.390	2.660	3.232
120	1.289	1.658	1.980	2.358	2.617	3.160
240	1.285	1.651	1.970	2.342	2.596	3.125
inf.	1.282	1.645	1.960	2.326	2.576	3.090

Source: Computed by P. J. Hildebrand.