BIOS 600 · Quiz 9.3: Confidence Intervals and Sample Size

Fall 2011

1. **Honor Pledge:** I have neither given nor received unauthorized aid on this assignment.
(Sign and print your name.)

2. A nutrition researcher collected data from 1200 high school seniors about their dietary habits. The researcher calculated the mean level of fat intake (in calories) and the corresponding 95% confidence interval. The results where $\hat{\mu} = 747$ and (691, 803).

How should this researcher interpret these results? (Circle one).

(a) There is a 95% probability that μ is between 691 and 803.

(b) 95% of the possible values for μ lie between 691 and 803.

(c) None of the above.

3. An investigator wishes to compare a new drug to placebo. The treatment drug has been developed to enhance a patient's statistical abilities. The investigator gives a test to both groups ($n_1 = n_2 = 100$) and counts how many patients in each group pass. The investigator finds that 47 subjects pass in the treatment group, and 26 subjects pass in the placebo group.

Calculate the 95% confidence interval for $p_{trt} - p_{placebo}$ using the following formula:

$$(\hat{p}_1 - \hat{p}_2) \pm Z_{1-\alpha/2} \sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1} + \frac{\hat{p}_2(1-\hat{p}_2)}{n_2}}.$$

4. The same investigator wants to use the data she collected as the basis for a grant application for a better funded study. In the future study, the researcher will calculate a 95% confidence interval. She wants the total width of the confidence interval to be no larger than 0.16.

As part of the researcher's grant application, she needs to provide sample size calculations. She correctly uses the formula:

$$n = 2\left(\frac{Z_{1-\alpha/2}\sqrt{p_1(1-p_1) + p_2(1-p_2)}}{d}\right)^2$$

where n is the number of patients in each group.

What sample size ($n_1 + n_2$) did she submit in her application? *(Hint: z-table and 2 sided t-table on back page.)*

z Quantiles

p	q
0.025	-1.9600
0.05	-1.6449
0.1	-1.2816
0.15	-1.0364
0.2	-0.8416
0.25	-0.6745
0.3	-0.5244
0.35	-0.3853
0.4	-0.2533
0.45	-0.1257
0.5	0.0000
0.55	0.1257
0.6	0.2533
0.65	0.3853
0.7	0.5244
0.75	0.6745
0.8	0.8416
0.85	1.0364
0.9	1.2816
0.95	1.6449
0.975	1.9600

2 sided t-table

	p=0.5	0.6	0.7	0.8	0.9	0.95	0.98	0.99
df=1	1.000	1.376	1.963	3.078	6.314	12.706	31.821	63.657
2	0.816	1.061	1.386	1.886	2.920	4.303	6.965	9.925
3	0.765	0.978	1.250	1.638	2.353	3.182	4.541	5.841
4	0.741	0.941	1.190	1.533	2.132	2.776	3.747	4.604
5	0.727	0.920	1.156	1.476	2.015	2.571	3.365	4.032
6	0.718	0.906	1.134	1.440	1.943	2.447	3.143	3.707
7	0.711	0.896	1.119	1.415	1.895	2.365	2.998	3.499
8	0.706	0.889	1.108	1.397	1.860	2.306	2.896	3.355
9	0.703	0.883	1.100	1.383	1.833	2.262	2.821	3.250
10	0.700	0.879	1.093	1.372	1.812	2.228	2.764	3.169