Math 373 Hw 16 Worked examples and comments.

Hw 308: 8.56, 8.58, 8.60b, 8.62. 8.64. Rec 308: 8.55, 8.57, 8.61, 8.63.

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8.57(2). You wish to estimate a binomial proportion p correct to within .04 with probability 95%. If p is in [.1, .3], how large must n be?

The two endpoints, .1 and .3, give different values for the std. dev. choose the largest std. dev. This is the worst-case value. The size n which works for the worst case, will work for any other case.

(a) $\sigma \approx \sqrt{.3 * .7} = .46$

(b) Equation: $E = z_{\alpha/2} SE$

$$.04 = (1.96)\sqrt{\frac{(.3)(.7)}{n}}$$

(c) $n =$ **505**

8.59(3). Independent random samples, both of size n, are selected from binomial populations 1 and 2. You wish to estimate the difference in the two binomial population proportions p_1 and p_2. Your estimate must be accurate to within .05 with probability 98%.

(a) You don't know p_1 and p_2. What "worst-case" value should you use for p_1 and p_2 in estimating the std. dev?

$p_1 = p_2 = .5$ $\sigma =$ **.5**

(b) Equation: $.05 = (2.33).5\sqrt{\frac{2}{n}}$

(c) $n =$ **1086**

8.61(2). (b) You wish to estimate, to within 1% with a 95% confidence level, the percentage of people who agree with a certain statement. To do this, you will poll a random sample of people. How many people should be polled?

(a) $E = .01$ $SE = \sqrt{\frac{.5 \times .5}{n}} = .5\sqrt{\frac{1}{n}}$

(b) $.01 = (1.96).5\sqrt{\frac{1}{n}}$

(b) $n =$ **9604**

8.63(4). The annual consumption of beef per person for Germans and Italians ranges from 0 to 104 lbs. To estimate the difference in beef consumption between the two groups to within 5 lbs. per year, you select a sample of n people from each group and have them report their daily beef consumption for a year. You wish the measure the difference in beef consumption between the two groups to within 5 lbs. per year with a probability of 99%.

(a) Estimate the std. dev. σ of each group.

$\sigma =$ **26**

(a′) Estimate the std. dev. for the difference of the two n -element groups.

$$\sigma = 26\sqrt{\frac{2}{n}}$$

(c) Equation: $5 = (2.58)26\sqrt{\frac{2}{n}}$

(d) How large should n?

$n =$ **360**

8.65(2). How many hunters should be surveyed to estimate, to within 2 days, the average number of days per year a licensed hunter hunts? Suppose the std. dev. (sample std. dev. not SE) in last year's survey was $\sigma =$ 10. If the confidence level isn't given, assume 95%.

(a) $2 = (1.96)\frac{10}{\sqrt{n}}$

(b) $n =$ **97**