

Lesson 7 – Confidence Intervals

At Home Problem Solutions

PROBLEM # 7.6 In this case, we need to assume that the population is normally distributed and the population standard deviation is known.

PROBLEM # 7.8 When $n < 30$, we must assume that the population is approximately normally distributed.

PROBLEM # 7.9 Referring to the 0.025 column and the d.f. = 19 row of the t table, the value of t corresponding to an upper tail area of 0.025 is $t = 2.093$.

PROBLEM # 7.11

a) $P(t \geq A) = 0.025$

$P(t \geq A) = 0.025$. From the 0.025 column and the d.f. = 25 row of the t table, $A = 2.060$.

b) $P(t \leq A) = 0.10$

$P(t \leq A) = 0.10$. Referring to the 0.10 column and the d.f. = 25 row of the t table, the value of t corresponding to a right-tail area of 0.10 is $t = 1.316$. Since the curve is symmetrical, the value of t for a left-tail area of 0.10 is $A = -1.316$.

c) $P(-A \leq t \leq A) = 0.98$

$P(-A \leq t \leq A) = 0.98$. In this case, each tail will have an area of $(1 - 0.98)/2 = 0.01$. Referring to the 0.01 column and the d.f. = 25 row of the t table, $A = 2.485$.

PROBLEM # 7.17

For the 99% level of confidence, $z = 2.58$. The maximum likely error is $e = 0.02$ (2 percentage points). If we make no estimate regarding the actual population proportion, we can be conservative and use $p = 0.5$. The recommended sample size would be:

$$n = \frac{z^2 p(1-p)}{e^2} = \frac{2.58^2 (0.5)(1-0.5)}{0.02^2} = 4160.25, \text{ rounded up to } 4161$$

Persons who are aware that Count Chocula is a kid's cereal, and that senior citizens don't tend to consume the product, might want to use a lower estimate, such as $p = 0.10$. In this case, we would end up with a recommended sample size of just 1498.

PROBLEM # 7.18

Using the Estimators workbook that accompanies Data Analysis Plus:

	A	B	C	D	E
1	z-Estimate of a Proportion				
2					
3	Sample proportion	0.20	Confidence Interval Estimate		
4	Sample size	400	0.200	±	0.039
5	Confidence level	0.95	Lower confidence limit		0.161
6			Upper confidence limit		0.239

PROBLEM # 7.19

point estimate of the population proportion.

point estimate of π : $p = \frac{450}{1000} = 0.45$

- a. Confidence interval estimate for the population proportion.

confidence interval for π : 0.419 to 0.481

- b. Confidence level and the confidence coefficient.

confidence level: 95%; confidence coefficient: 0.95