p. 669

(45) a) Population of Interest: students in Tonya's dorm

p = proportion of the residents in Tonya's who like the dorm food

b) $\hat{p} = 14/50 = 28\% \Rightarrow p$

c) 1) SRS - yes, stated in problem

2) Independence - 175 students in dorm $\not\geq 10(50)$ <u>Not met</u>

3) Normality - $50(.28) \geq 10$, $14 \geq 10$ ✓ $50(.72) \geq 10$, $38 \geq 10$ ✓

(46) a) Population of Interest: students at Glenn's college

p = proportion of the students at Glenn's college who think tuition is too high

b) $\hat{p} = 38/50 = 76\% \Rightarrow p$

c) 1) SRS - yes, stated in problem

2) Independence - $2400 \geq 10(50)$ Condition met

3) Normality - $50(.76) \geq 10$, $38 \geq 10$ $50(.24) \geq 10$, $12 \geq 10$ Condition met

(47) Population of Interest - all heterosexual adults

a) p = proportion of all adults heterosexuals who received a blood transfusion and had a sexual partner with a high risk of AIDS

b) $\hat{p} = 0.2\%$

c) 1) SRS - sample, but not SRS 2) Independence - all heterosexual adults $\geq 10(2673)$ Condition met

3) Normality - $2673(.002) \not\geq 10$, 5.346 <u>Condition Not Met</u>

p. 669

(48) $n = 430{,}000$ $\quad \hat{p} = .87$ $\quad z^*_{.95} = 1.96$ $\quad se = \sqrt{\frac{(.87)(.13)}{430000}}$

a) $me = \pm 1.96 \sqrt{\frac{(.87)(.13)}{430000}}$

$= \pm 1.96(.0005) = \pm .001$

(49) a) Population: all college undergraduates

$\hat{p}$ = proportion of college undergraduates who are nondrinkers

b) 1) SRS - stated in problem

2) ~~Independence~~ - all college undergraduates $\geq 10(10{,}904)$ Condition met

3) Normality - $2105 \geq 10$ $\quad 8799 \geq 10$ Condition met

c) Method of Inference: 99% confidence interval for 1 sample proportion

Parameter: p = proportion of college undergraduates who are nondrinkers

Conditions: (See part (b) - All conditions met)

Calculations: $\hat{p} = \frac{2105}{10904} = .193$ $\quad \hat{q} = .817$ $\quad z^*_{.99} = 2.576$

$.193 \pm 2.576\left(\sqrt{\frac{(.193)(.817)}{10904}}\right) = .193 \pm 2.576(.0038)$

$= .193 \pm .0097$

$(.1883, .2028)$

Conclusion: We are 99% confident the true proportion of all college students who are nondrinkers is in the interval 18.83% to 20.28% for a sample size $n = 10904$.

p. 669

(50) Method of Inference: 95% confidence interval for 1 sample proportion

Parameter: p = true proportion of adults who were satisfied with the way things were going in the US

Conditions: 1) SRS - random sample, not SRS

2) Independence - all US adults $\geq 10(1633)$ Condition Met

3) Normality - $1127 \geq 10$ $506 \geq 10$ Condition Met

Calculations: $\hat{p} = \frac{1127}{1633} = .69$ $\hat{q} = .31$ $n = 1633$ $z^*_{.95} = 1.96$

$$.69 \pm 1.96\left(\sqrt{\frac{(.69)(.31)}{1633}}\right) = .69 \pm 1.96(.0114) = .69 \pm .022$$

$$(.668, .713)$$

Conclusion: We are 95% confident the true proportion of US adults who were satisfied with the way things were going in the US is in the interval 66.8% to 71.3% for a sample size $n = 1633$.

(54) $\hat{p} = .44$ $z^*_{.95} = 1.96$ a) $\pm .03 \geq 1.96\sqrt{\frac{(.44)(.56)}{n}}$

$$\pm .01531 \geq \sqrt{\frac{.2464}{n}}$$

$$(.01531)^2 \geq \frac{.2464}{n}$$

$$(.01531)^2 n \geq .2464$$

$$n \geq \frac{.2464}{(.01531)^2}$$

$$n \geq 1051$$

(54) b) $\pm .03 \geq 1.96\sqrt{\frac{(.5)(.5)}{n}}$

$$.01531 \geq \sqrt{\frac{.25}{n}}$$

$$(.01531)^2 \geq \frac{.25}{n}$$

$$(.01531)^2 n \geq .25$$

$$n \geq \frac{.25}{(.01531)^2}$$

$$n \geq 1067.9 \quad \boxed{n = 1068}$$

Conservative approach, $p^* = .5$, requires 16 more adults to achieve a margin of error of $\pm .03$.

(55) $\hat{p} = .64 \quad z^*_{.05} = 1.96 \quad n = 1028$

a) $.64 \pm 1.96\sqrt{\frac{(.64)(.36)}{1028}} \quad (.61, .64)$

We are 95% confident the true proportion of teens age 13 to 17 that have TVs in their room is in the interval 61% to 64% for sample size n = 1028

b) Not all samples will give the same results. Margin of error accounts for the variability from sample to sample.

c) Voluntary bias Nonresponse bias

p.673

56) $\hat{p} = .7$ $\quad .04 \geq 1.645\sqrt{\frac{(0.7)(0.3)}{n}}$

a) $z^*_{.90} = 1.645$ $\quad \frac{.04}{1.645} \geq \sqrt{\frac{.21}{n}}$

$n(.0243)^2 \geq .21$ $\quad n \geq 355.17$

$n \geq \frac{.21}{(.0243)^2}$

It will take an SRS of $n = 356$ students to have a margin of error of 4% with 90% confidence.

b) $me = 1.645\sqrt{\frac{(.5)(.5)}{356}}$

$= .0436$

58) $\hat{p} = .2$ $\quad .015 \geq 2.576\sqrt{\frac{(.2)(.8)}{n}}$

$z^*_{.99} = 2.576$ $\quad \frac{.015}{2.576} \geq \sqrt{\frac{.16}{n}}$

$n\left(\frac{.015}{2.576}\right)^2 \geq .16$ $\quad n \geq 4718.77$

$n \geq \frac{.16}{\left(\frac{.015}{2.576}\right)^2}$

Sample size of $n = 4719$ needed.

b) $me = 2.576\sqrt{\frac{(.1)(.9)}{4719}} = 0.0112$

(59) Method of inference: 99% confidence interval for 1 sample proportions.

a) Parameter: p = the true proportion of fatally injured bicyclists aged 15 or older who ~~test~~ test positive for alcohol

Conditions: ① SRS - not stated, no reason to assume not SRS

② Independence - # of all bicyclists 15 yrs or older $\geq 10(1711)$ Condition Met

③ Normality - $542 \geq 10$ $1169 \geq 10$ Condition Met

Calculations: $\hat{p} = \frac{542}{1711} = .317$ $\hat{q} = .683$ $n = 1711$ $z^*_{.99} = 2.576$

$.317 \pm 2.576\sqrt{\frac{(.317)(.683)}{1711}}$ $(.2878, .3457)$

Conclusion: We are 99% confident the true proportion of fatally injured bicyclists aged 15 or older who test positive for alcohol is in the interval 28.8% to 34.6%.

b) No, we do not know the proportion of bicyclists who were not involved in fatal accidents had alcohol in their systems

(60) $.04 \geq 1.96\sqrt{\frac{(.75)(.25)}{n}}$

$n\left(\frac{.04}{1.96}\right)^2 \geq .1875$

$n \geq \frac{.1875}{\left(\frac{.04}{1.96}\right)^2}$

$n \geq 450.19$

You would need a sample of $n = 451$ Americans with at least 1 Italian grandparent.