

## Third Examination Study Guide

1. What is a *standard error* and what is a *margin of error*?
2. What is the difference between *point* and *interval* estimation?
3. Understand the “anatomy” of a confidence interval (i.e., point estimate, standard score, standard error, and margin of error). Be able to identify each part of a confidence interval.
4. Be able to find/compute the point estimate, standard error, margin of error, and confidence interval when estimating  $p$ .
5. Be able to find/compute the point estimate, standard error, margin of error, and confidence interval when estimating  $\mu$  (also know how to do this when sampling without replacement when  $N$  is known).
6. Be able to find/compute the point estimate, standard error, margin of error, and confidence interval when estimating  $\tau$  when sampling without replacement.
7. What is meant by the *confidence level* of a confidence interval? How do you find the value of  $z$  or  $t$  for a specified confidence level?
8. What effect does increasing the *confidence level* have on the margin of error and the confidence interval? What effect does increasing the *sample size* have on the margin of error and the confidence interval?
9. How do you choose the sample size when estimating  $p$  with  $\hat{p}$ ?
10. How do you choose the sample size when estimating  $\mu$  with  $\bar{x}$ ?
11. What is sampling *with* versus *without* replacement?
12. What do we need to *assume* when making inferences about  $\mu$ ,  $p$ , and  $\tau$  using the methods we have discussed?
13. What is meant by saying that a statistic is *unbiased*? What does it mean to say that a statistic is *biased*?
14. What are the three sources of bias that we discussed in class?
15. When is the sampling distribution of  $\bar{x}$  or  $\hat{p}$  approximately normal in shape?
16. What is the *randomized response method*? How does it work? Why is it used?
17. As always, be comfortable with symbols/notation (e.g.,  $\mu$ ,  $\bar{x}$ ,  $p$ ,  $\hat{p}$ ,  $m$ ,  $n$ ,  $N$ ,  $s$ ,  $\sigma$ ,  $\tau$ ).

Formulas/expressions you should understand when and how to use.

$$\begin{array}{ccc}
 \sqrt{\hat{p}(1-\hat{p})/n} & z\sqrt{\hat{p}(1-\hat{p})/n} & \hat{p} \pm z\sqrt{\hat{p}(1-\hat{p})/n} \\
 \frac{s}{\sqrt{n}} & t\frac{s}{\sqrt{n}} & \bar{x} \pm t\frac{s}{\sqrt{n}} \\
 \frac{s}{\sqrt{n}}\sqrt{1-\frac{n}{N}} & t\frac{s}{\sqrt{n}}\sqrt{1-\frac{n}{N}} & \bar{x} \pm t\frac{s}{\sqrt{n}}\sqrt{1-\frac{n}{N}} \\
 N\frac{s}{\sqrt{n}}\sqrt{1-\frac{n}{N}} & tN\frac{s}{\sqrt{n}}\sqrt{1-\frac{n}{N}} & N\bar{x} \pm tN\frac{s}{\sqrt{n}}\sqrt{1-\frac{n}{N}} \\
 n = \frac{z^2 p(1-p)}{m^2} & n = \frac{z^2 \sigma^2}{m^2} & \\
 n-1 & n\hat{p} \geq 15 & n(1-\hat{p}) \geq 15
 \end{array}$$