

Fifth Examination Study Guide

1. Understand the difference between *independent* and *dependent* samples.
 2. Understand how to conduct a statistical test concerning $p_1 - p_2$.
 3. Understand how to compute a confidence interval to estimate $p_1 - p_2$.
 4. Understand how to conduct a statistical test concerning $\mu_1 - \mu_2$.
 5. Understand how to compute a confidence interval to estimate $\mu_1 - \mu_2$.
 6. Understand the advantages of dependent (matched) samples.
 7. Understand why we might use the alternative standard error for $\bar{x}_1 - \bar{x}_2$.
 8. Understand the concepts we discussed concerning causal inference including *confounding variables*, *conditioning*, *randomization*, *instrumental variables*, the *placebo effect*, the *observer-expectancy effect*, *single-blind* studies, and *double-blind* studies. You might find it useful to understand these concepts in terms of the causal diagrams.
 9. Understand the survey sampling designs covered in lecture: *simple random sampling*, *stratified random sampling*, and *cluster sampling* (one- and two-stage), and *systematic sampling*. Also understand the advantages and/or disadvantages of these designs.
 10. Understand the misconceptions and limitations of statistical tests discussed in lecture.
- Formulas/expressions you should understand when and how to use.

$$\hat{p}_1 - \hat{p}_2 \pm z \sqrt{\frac{\hat{p}_1(1 - \hat{p}_1)}{n_1} + \frac{\hat{p}_2(1 - \hat{p}_2)}{n_2}}$$

$$z = \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\hat{p}(1 - \hat{p}) \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}}$$

$$\bar{x}_1 - \bar{x}_2 \pm t \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$$

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$