Second Examination Study Guide

1. Understand what is meant by *random variables*, and *discrete* versus *continuous* quantitative random variables.
2. Understand what is meant by the *probability distribution* of a discrete random variable.
3. Understand what is meant by a *population distribution* and a *sampling distribution*.
4. Be able to compute the *mean*, *variance*, and *standard deviation* of a discrete random variable from its probability distribution (when given as a table of values and probabilities).
5. Know how to compute probabilities using the probability distribution of a *discrete* random variable.
6. Know how to compute probabilities using the probability distribution of a *continuous* random variable.
7. Know how to compute probabilities using a *normal* probability distribution (with statdistributions.com).
8. Know how to *derive* a sampling distribution using the five-step method.
9. Know how to use the *binomial distribution* to derive the sampling distribution of $\hat{p}$.
10. Know how to find/compute the mean and standard deviation of $\bar{x}$ and $\hat{p}$.
11. Know how to find the interval that has a probability of approximately 0.95 of containing $\bar{x}$ or $\hat{p}$.
12. Understand what it means to say that a statistic is *unbiased*.
13. Understand what is meant by the *standard error* of a statistic.
14. Understand what is implied by the *central limit theorem*.
15. Why do we divide by $n-1$ rather than n when computing s^2?
16. Be sure you know the notation (i.e., symbols) we have used (e.g., μ, σ, σ^2, p, $\bar{x}$, $\hat{p}$, n, μ_x, $\mu_{\bar{x}}$, $\mu_{\hat{p}}$, σ_x, $\sigma_{\bar{x}}$, $\sigma_{\hat{p}}$).

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

$$\mu = \sum_x xP(x) \qquad \sigma^2 = \sum_x (x-\mu)^2 P(x) \qquad \sigma = \sqrt{\sum_x (x-\mu)^2 P(x)}$$

$$z = \frac{x-\mu}{\sigma}$$

$$P(s) = \frac{n!}{s!(n-s)!} p^s (1-p)^{n-s}$$

$$\sigma_{\bar{x}} = \sigma_x/\sqrt{n} \qquad \sigma_{\hat{p}} = \sqrt{p(1-p)/n}$$