

## Stat 218 – Exam 1 Preparation

### *When and where?*

The exam will be given on Thursday, January 26 at the usual time in our usual classroom (02-206). You'll have 50 (at the very most 55) minutes to take the exam, so don't be late!

### *What's covered?*

The exam covers days 1-12 of class, portions of chapters 1-6 of your text.

### *What should I bring?*

You should definitely bring your text, your class notes, and a calculator. I especially encourage you to bring well-organized notes, perhaps based on this handout, to the exam. You are welcome to bring homework solutions and anything else that I have posted on the web. You are welcome to borrow a booklet of tables, but you will not have access to computers during the exam.

### *What if I've missed something?*

You can download daily class outlines from the web. You can also find solutions to optional homework problems through Blackboard.

### *What kinds of questions should I expect?*

There will be a mixture of question types. There will be some short answer questions (e.g., identifying types of variables, distinguishing parameters and statistics), some questions that ask for calculations (e.g., five-number summary, normal probability, confidence interval), and some that call for interpreting results or explaining some phenomenon (e.g., interpreting boxplots, explaining the effect of sample size on sampling variability). Many of these questions will be presented in the context of an actual study, and you should be sure to relate your answers to the context of that study. Some questions will involve interpreting Minitab output, possibly picking out relevant from irrelevant output. In general, the questions should be of similar types to what you've answered in class examples, investigations, and optional homework problems.

### *How should I study?*

- Prepare and organize your notes carefully.
- Re-read the assigned sections of the text.
- Focus on understanding, not memorization.
- Look over and re-work the class outlines, examples, and questions.
- Review, re-work, and check comments on investigation questions.
- Answer the optional homework problems, check solutions in back of book and through Blackboard.
- Answer additional questions from the end of the chapters of your text.

- Ask questions during class today!
- Ask questions in office hours.

*Any other advice?*

- Don't study less because it's an open-book exam!
- Plan not to rely on notes and book too much.
- Read questions carefully.
- Pay attention to the context, both when reading questions and when writing answers.
- Write and explain your answers very clearly.
- Be cognizant of time constraint.
- Don't elaborate excessively.
- Don't be late!

**Outline** (of most important topics)

- Fundamental Terms
  - Observational unit, variable
    - Categorical, quantitative
  - Population, sample
  - Parameter, statistic
- Graphical displays
  - Dotplot, histogram, stemplot, boxplot
  - Features: shape, center, spread, gaps/peaks, outliers
- Numerical summaries
  - Mean, median
  - Standard deviation, IQR
  - Five-number summary
  - Outlier test
  - Empirical rule
  - $z$ -scores
- Sampling
  - Bias, precision
  - Random sampling, table of random digits
  - Effect of sample size
- Normal distributions
  - Normal curve, mean and std dev, standard normal curve
  - Calculations: standardization ( $z$ -score), normal probability table, normal percentiles
  - Assessing normality: normal probability plot, transformations
- Sampling distributions
  - Sampling variability, effect of sample size
  - Of sample proportion: key result, technical conditions, applications, effect of sample size
  - Of sample mean: normal population, general population, key result, Central Limit Theorem, applications, effect of sample size

- Confidence intervals
  - General ideas
    - Form: point estimate  $\pm$  (critical value) x (standard error)
    - Interpretations: of confidence interval, of confidence level
    - Effects of sample size, confidence level, sample variability, sample mean
  - For population mean  $\mu$

- $z$ -interval:  $\bar{y} \pm z^* \frac{\sigma}{\sqrt{n}}$  (when population standard deviation  $\sigma$  is known)

- $t$ -interval:  $\bar{y} \pm t^* \frac{s}{\sqrt{n}}$ 
  - Reflects additional uncertainty of estimating  $\sigma$  by sample standard deviation  $s$
  - Degrees of freedom
  - Technical conditions
- Sample size determination