

PSTAT 5E Final EXAM

Exam Time: Monday March 20, 12:00-3:00 p.m.

Final Room: **BRDA** (regular room) and **IV THEA2 (overflow room)**

If you are in Biliana Bagasheva's or Marick Sinay's sections, you will be taking the exam in **IV THEA2**. All other students will be taking the exam in **BRDA**.

What to bring:

1. Picture ID – will be checked as you turn your exam in. **NO ID = NO EXAM**
2. Calculator
3. Textbook and notes
4. Scratch paper

The exam will cover: Chapters 1-8 and 11. It will be based on the material discussed in lectures.

Comments:

1. If you miss the final you will receive a grade of “zero” for the exam, unless you have a well documented legitimate excuse.
2. Turn off cell phones. Cell phone cheating will be considered as academic misconduct.
3. If you are a student with disabilities and need special arrangements, please speak to the instructor **AS SOON AS POSSIBLE**.

Specific Topics:

inference process - six steps

population, sample

experimental units, variables, measurements

variables - univariate, bivariate, multivariate

types of variables - qualitative

- quantitative
- discrete
- continuous

descriptive methods - graphs

- for qualitative data: pie and bar charts
- for quantitative data: scatterplot, stem and leaf, relative frequency histogram (Note: different from the book)
- describing data distribution
 - shape - symmetric, skewed left or right
 - proportion of measurements in certain intervals
 - outliers

descriptive methods - numerical measures

- measures of central tendency: mean, median, mode
- measures of variability: range, variance (both population and sample), standard deviation
- measure of relative standing: percentile, quartiles, interquartile range
- boxplot (Note: different from the book)

Experiment, event, simple events, mutually exclusive event, sample space
probability and properties
sum of simple events
event relations: union, intersection, complementary
conditional probability, independent and dependent events
additive and multiplicative rules
law of total probability
Bayes rule

random variable: discrete

- probability distribution
- mean
- variance and standard deviation

Binomial random variables

- five characteristics
 - n identical trials
 - two outcomes
 - probability of success remains constant
 - trials are independent
 - x is the number of successes
- computation
 - formula
 - Table 1
- mean and standard deviation

Poisson random variables

- computation
 - formula
 - Table 2
- mean and standard deviation

Random variable: continuous probability distribution

- smooth curves
- area under the curve between a and b represents the probability that x falls between a and b
- $P(x=a)=0$ for any a

Normal random variables

- symmetric about its mean
- shape determined by its standard deviation
- standard normal has mean 0 and standard deviation 1
- Use Table 3 and probability properties to compute probabilities
- any normal random variable can be transformed to a standard normal random variable

Sampling plants and experimental design

- simple random sampling

Statistics and sampling distribution

- statistics
- sampling distribution of statistics
- central limit theorem
- sampling distribution of sample mean
- sampling distribution of sample proportion

Estimation

- types of estimators
 - point estimator
 - interval estimator/confidence interval
- properties of good estimators
 - unbiased
 - minimum variance

Large sample estimation of a population mean or proportion

- point estimator
- normal approximation
- margin of error
- confidence coefficient and confidence interval
- interpretation of confidence intervals

Large sample estimation of difference between two population means or proportions

- point estimator
- normal approximation
- margin of error
- confidence interval
- how to conclude if difference is statistically significant

Small sample estimation of a population mean and difference between two population means or proportions

- t distribution
- margin of error
- confidence interval
- how to conclude if difference is statistically significant

Hypothesis test

- five steps (***)Note: decision based on p-values. Did not cover critical value and region/acceptance region)
- null and alternative hypotheses
- one sided and two sided tests
- test statistic
- type I and type II errors
- significance level
- p-value
- large and small sample test for a population mean
- large and small sample test for difference between two population means
 - paired-difference test

Linear Regression

- independent and dependent variables
- deterministic and probabilistic models
- simple linear regression model

- random errors and their assumptions
- interpretations of intercept and slope
- steps in regression analysis
- least squares method
- point and interval estimates of the intercept and slope
- analysis of variance and ANOVA table
- coefficient of determination and its interpretation
- hypothesis test concerning the slope
- estimation and prediction, confidence intervals, difference between them