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