

STA 371G Outline

Spring 2017

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Office Hours: Monday & Wednesday 3:30-5:00 PM. You are welcome to come by my office at other times.

Wednesday, January 18

Topics:

- Introduction
- Probability
- Random variables

Reading Assignments:

You are recommended to read:

Chapter 1 of OpenIntro Statistics, 3rd edition

Monday, January 23

Topics:

- Probability distributions
- Mean, variance and standard deviation of a random variable

Reading Assignments:

If you are not familiar with the topics discussed in class, you are recommended to read:

pp. 156-168, 189-195, of Data analysis and decision making, 4th edition

or

pp. 196-206, 225-231 of Data analysis and decision making, 3rd edition

You are also recommended to read:

pp. 1-14 of “1TopicSummary_ProbabilityConceptsAndNormalDistributions.pdf” (available in Canvas/files)

To learn more about these topics, you may further read:

Chapters 2.1, 2.2, 2.4, and 2.5 of OpenIntro Statistics, 3rd edition

Wednesday, January 25

- Mean, variance and standard deviation of a random variable
- Add a constant to a random variable
- Multiply a random variable by a constant
- Conditional, joint and marginal probabilities

Monday, January 30

- Conditional, joint and marginal probabilities
- Independent random variables, sum of independent random variables

Wednesday, February 1

- Continuous random variables
- Probability density function: area under the curve represents probability
- Standard normal distribution $Z \sim \mathcal{N}(0, 1)$
- Normal distribution $X \sim \mathcal{N}(\mu, \sigma^2)$
- If $X \sim \mathcal{N}(\mu, \sigma^2)$, then $P(X < x) = P(\frac{X-\mu}{\sigma} < \frac{x-\mu}{\sigma}) = P(Z < \frac{x-\mu}{\sigma})$.

Reading Assignments:

To get familiar with the normal distribution, you are recommended to read:

pp. 211-215, 217-225 of Data analysis and decision making, 4th edition

or

pp. 247-250, 253-260 of Data analysis and decision making, 3rd edition

You are also recommended to read:

pp. 15-30 of “1TopicSummary_ProbabilityConceptsAndNormalDistributions.pdf” (available in Canvas/files)

You may further read:

Chapters 3.1.1, 3.1.2, 3.1.4 and 3.1.5 of OpenIntro Statistics, 3rd edition

Monday, February 6

- Standard normal calculations in Excel: NORMSDIST, or in R: pnorm (type “?pnorm” in R for help).
- Understand the meaning of the standard deviation σ in a normal distribution: $P(\mu - \sigma < X < \mu + \sigma) = ?$ and $P(\mu - 2\sigma < X < \mu + 2\sigma) = ?$

- Normal calculations in Excel:
NORMSDIST, NORMDIST
NORMSINV, NORMINV
or in R:
pnorm, qnorm (type “?pnorm” and “?qnorm” in R for help).
- Standardizing a normal random variable $Z = \frac{X-\mu}{\sigma} \sim \mathcal{N}(0,1)$
Interpretation: the value of Z is the number of standard deviations that X deviates towards the left (if $Z < 0$) or the right (if $Z > 0$) of the mean.
- Plot a normal distribution in Excel and R
- Example: Testing at ZTel, we will make an Excel spreadsheet for calculations
- Case study, Texas BBA Salary Statistics
- Expectation of a continuous random variable
- Binomial distribution and its normal approximation

Wednesday, February 8

- Binomial distribution and its normal approximation
- Case study: Texas BBA Demographics
- Binomial distribution $X \sim \text{Binomial}(n, p)$. Examples: the number of “Heads” in 100 coin flips, the number of votes for Republican in 1000 voters
- The normal approximation to the binomial $X \sim \mathcal{N}(np, np(1-p))$
- Important concepts: Population and Sample
- Sampling distribution of a sample proportion
- Case study: A national poll of 803 adults by Anzalone Liszt Grove Research

Reading Assignments:

Lecture notes 3 and 4 posted on the course website.

To learn more about the binomial distribution, its normal approximation, and the sampling distribution of a sample proportion, please read:

pp. 233-239, 403-404 of Data analysis and decision making, 4th edition
or
pp. 268-273, 438-439 of Data analysis and decision making, 3rd edition

For this topic, you may further read:

Chapters 3.4.1, 3.4.2 and 6.1 of OpenIntro Statistics, 3rd edition