STA 371G Outline
Spring 2015

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Office Hours: Monday Wednesday 5:00-6:30 PM. You are welcome to come by my office at other times.

Wednesday, January 21

Topics:

- Introduction
- Probability
- Random variables
- Probability distributions

Monday, January 26

Topics:

- 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

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

To learn more about these topics, you may further read:
Chapters 2.1, 2.2, 2.4, and 2.5 of OpenIntro Statistics, 2nd edition

Wednesday, January 28

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

- Continuous random variables
- Probability density function: area under the curve represents probability
- Standard normal distribution $Z \sim \mathcal{N}(0,1)$

Monday, February 2

- Standard normal calculations in Excel: NORMSDIST,
  or in R: pnorm (type "?pnorm" in R for help).
- Normal distribution $X \sim \mathcal{N}(\mu, \sigma^2)$
- 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).
- 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 random variable
- If $X \sim \mathcal{N}(\mu, \sigma^2)$, then $P(X < x) = P(\frac{X-u}{\sigma} < \frac{x-u}{\sigma}) = P(Z < \frac{x-u}{\sigma})$.
- 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.

  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 may further read:

  Chapters 3.1.1, 3.1.2, 3.1.4 and 3.1.5 of OpenIntro Statistics, 2nd edition

Wednesday, February 4

- Case study: Texas BBA Statistics
- 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 $X \sim \mathcal{N}\left(np, np(1-p)\right)$
- 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, 2nd edition