

STA 371G Outline

Spring 2016

Instructor: Mingyuan Zhou, Ph.D., Assistant Professor of Statistics

Office: CBA 6.462

Phone: 512-232-6763

Email: mingyuan.zhou@mcombs.utexas.edu

Website: <http://mingyuanzhou.github.io/>

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

Tuesday, January 19

Topics:

- Introduction
- Probability
- Random variables

Reading Assignments:

You are recommended to read:

Chapter 1 of OpenIntro Statistics, 3rd edition

Thursday, January 21

Topics:

- Probability distributions
- Mean, variance and standard deviation of a random variable
- Add a constant to a random variable
- Multiply a random variable by a constant

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, 3rd edition

Tuesday, January 26

- 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 $Z \sim \mathcal{N}(0, 1)$

Thursday, January 28

- 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).
- If $X \sim \mathcal{N}(\mu, \sigma^2)$, then $P(X < x) = P(\frac{X-\mu}{\sigma} < \frac{x-\mu}{\sigma}) = P(Z < \frac{x-\mu}{\sigma})$.
- 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, 3rd edition