

# STA 371G Outline

## Spring 2014

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Office Hours: Tuesday Thursday 3:30-4:30 PM and by appointment

### Tuesday, January 14

#### Topics:

- Introduction
- Probability
- Random variables
- 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

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

### Thursday, January 16

#### Topics:

- Add a constant to a random variable
- Multiply a random variable by a constant
- 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  $Z \sim \mathcal{N}(0, 1)$

- Standard normal calculations in Excel: NORMSDIST, or in R: pnorm (type “?pnorm” in R for help).

## Tuesday, January 21

- Normal distribution  $X \sim \mathcal{N}(\mu, \sigma^2)$
- Understand the meaning of the standard deviation  $\sigma$  in a normal distribution:  $P(\mu - \sigma < X < \mu + \sigma) = ?$  and  $P(\mu - 2\sigma < X < \mu + 2\sigma) = ?$
- Standardizing a normal random variable  $Z = \frac{X - \mu}{\sigma}$   
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.
- 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
- Binomial distribution

## 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