# Review for Exam III Stat 205: Statistics for the Life Sciences

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## Logistics

- \* Multiple choice, 28 questions.
- \* You can bring one page (both sides) of formula sheet.
- \* No hats, no phones.
- \* Exam III covers Chapters 9, 10, 11, and 12.

# Chapter 9: Population proportion

- One population
  - Binary: p
  - Sample proportion estimate population proportion : $\hat{p}$
- Hypothesis testing and confidence interval:
  - $H_0: p = p_0$  vs.  $H_a: p \neq$ , or <, or  $> p_0$
  - R command:

```
binom.test(33,103,p=0.5,alternative="less")
```

```
Exact binomial test
```

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## Chapter 9 cont'd

### • One population

▶ More than two categories, eg., severity level (I, II, III), deer habitat, etc.

Table 9.4.1 Deer distribution				
Region	Acres	Proportion		
1. Inner burn	520	0.173		
2. Inner edge	210	0.070		
3. Outer edge	240	0.080		
4. Outer unburned	2,030	0.677		
	3,000	1.000		

#### • Hypothesis testing:

- $H_0$ : no preference vs.  $H_a$ : there is a preference
- Method:  $\chi^2$  goodness of fit test
  - ★ Observed vs. expected

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### Chapter 9 cont'd

- In R, needs to define two lists
  - List 1: observed counts, e.g.: deer=c(2,12,18,43)
  - List 2: a list of hypothesized H<sub>0</sub> probabilities, e.g.: prob=c(0.173,0.070,0.080,0.677)

### • R command:

```
> deer=c(2,12,18,43)
```

- > prob=c(0.173,0.070,0.080,0.677)
- > chisq.test(deer,p=prob)

Chi-squared test for given probabilities

```
data: deer
X-squared = 43.1524, df = 3, p-value = 2.284e-09
```

## Chapter 10 Contingency table

### Two populations

- In population 1, we observed  $y_1$  out of  $n_1$  successes;
- In population 2, we observed  $y_2$  out of  $n_2$  successes;

		Group	
		1	2
Outcome	Success	<i>y</i> 1	<i>y</i> 2
	Failure	$n_1 - y_1$	$n_2 - y_2$
	Total	<i>n</i> <sub>1</sub>	<i>n</i> <sub>2</sub>

•  $\hat{p}_1 = y_1/n_1$  estimates  $p_1$  &  $\hat{p}_2 = y_2/n_2$  estimates  $p_2$ .

•  $\chi^2$  test of independence

•  $H_0: p_1 = p_2$  vs.  $H_a: p_1 \neq p_2$