

# Practice

Tests of difference

# Problem 1: property values & road noise

- Group 1 Homes: interior of subdivision, road noise low
- Group 2 Homes: subdivision perimeter homes, road noise high
- Sample 1 (low noise)
  - Random, systematic interval sample
  - $n = 35$ , average  $\$/\text{ft}^2 = 6.95$
- Sample 2 (high noise)
  - Random, systematic interval sample
  - $n = 42$ , average  $\$/\text{ft}^2 = 6.05$
- $\alpha = 0.05$

# Problem 1: setup

- What is the question you are asking?
- What test should be run?
- What is the basis for assuming or not assuming normality?
- What are the  $H_0$  and the  $H_a$  for the test?

# Problem 1: results

- $F = 1.563$ ;  $p = 0.284$
- $t = 4.13$ ;  $p = 0.0007$  (2 tailed)
- What is the df for this test?

# Problem 1: phrasing results

- Step 1: what test was run and why was it run?
- Step 2: state significance/non-significance
- Step 3: accept or reject the  $H_0$
- Step 4: relate acceptance or rejection of  $H_0$  back to research question

## Problem 2: Stream pH

- **Group 1 streams:** those upwind of coal plants w/i 50 to 100 miles
- **Group 2 streams:** those upwind of coal plants w/i 0 to 50 miles
- **Group 3 streams:** those downwind of coal plants w/i 0 to 50 miles
- **Group 4 streams:** those downwind of coal plants w/i 50 to 100 miles

## Problem 2: Stream pH

- Each group was sampled using stratified random sampling of streams in the area
- Group 1:  $n = 11$ , average pH = 7.6
- Group 2:  $n = 27$ , average pH = 7.4
- Group 3:  $n = 37$ , average pH = 5.1
- Group 4:  $n = 16$ , average pH = 4.9

## Problem 2: setup

- What is the question you are asking?
- What test should be run?
- What is the basis for assuming or not assuming normality?
- What are the  $H_0$  and the  $H_a$  for the test?

# Problem 2 results

- Chi Square = 36.9
- What is the real name for the test statistic?
- What is the df for this test?
- $p < 0.0001$

## Problem 2: phrasing results

- Step 1: what test was run and why was it run?
- Step 2: state significance/non-significance
- Step 3: accept or reject the  $H_0$
- Step 4: relate acceptance or rejection of  $H_0$  back to research question

# Problem 3: Corn production

- Enquiring minds want to know; have soils deteriorated in Illinois to the point that corn production has dropped? Simple random sampling used to pick the 35 counties
- **Group 1 year 1962:** 35 counties in Illinois
  - Bushels / acre 125
- **Group 2 year 2007:** the same 35 counties in Illinois
  - Bushels / acre 122

# Problem 3: setup

- What is the question you are asking?
- What test should be run?
- What is the basis for assuming or not assuming normality?
- What are the  $H_0$  and the  $H_a$  for the test?

## Problem 3: results

- $t = 0.34$ ;  $p = 0.45$  (2 tailed)
- What is the df for this test?

# Problem 3: phrasing results

- Step 1: what test was run and why was it run?
- Step 2: state significance/non-significance
- Step 3: accept or reject the  $H_0$
- Step 4: relate acceptance or rejection of  $H_0$  back to research question

# Problem 4

- Enquiring minds want to know; do people who chase tornadoes have a shorter average life span?
  - Names were sampled from phone books randomly
  - People were phoned
  - They were asked: do you chase tornados?
  - They were then asked: what is your age?
- Group 1: tornado chasers
  - Average age 39, n = 14
- Group 2: general Oklahomans
  - Average age 65, n = 78

# Problem 4: setup

- What is the question you are asking?
- What test should be run?
- What is the basis for assuming or not assuming normality?
- What are the  $H_0$  and the  $H_a$  for the test?

# Problem 4: results

- $U = 32.7$ ;  $p = 0.0005$  (2 tailed)

# Problem 4: phrasing results

- Step 1: what test was run and why was it run?
- Step 2: state significance/non-significance
- Step 3: accept or reject the  $H_0$
- Step 4: relate acceptance or rejection of  $H_0$  back to research question

# Problem 5: chronic allergy cases

- Medical geographers want to determine which metropolitan area in Texas has the worst allergy problems
- They pharmacy records from Walgreens in Houston, San Antonio, El Paso, Austin, Dallas, Fort Worth, and Amarillo
- Question: how many prescriptions per year for allergy medicine do people fill?
- Systematic interval sample of records taken

# Problem 5: descriptives

- Houston:  $n = 52$ , average per year per patient = 4.3
- Austin:  $n = 43$ , average per year per patient = 5.1
- San Antonio:  $n = 56$ , average per year per patient = 4.7
- Dallas:  $n = 109$ , average per year per patient = 4.8
- Fort Worth:  $n = 87$ , average per year per patient = 4.9
- El Paso:  $n = 65$ , average per year per patient = 4.4
- Amarillo:  $n = 57$ , average per year per patient = 4.5

# Problem 5: setup

- What is the question you are asking?
- What test should be run?
- What is the basis for assuming or not assuming normality?
- What are the  $H_0$  and the  $H_a$  for the test?

# Problem 5: results

- $F = 2.1$ ;  $p = 0.08$
- What is the df for this test?

# Problem 5: phrasing results

- Step 1: what test was run and why was it run?
- Step 2: state significance/non-significance
- Step 3: accept or reject the  $H_0$
- Step 4: relate acceptance or rejection of  $H_0$  back to research question