

# In-Class Worksheet

STAT011 with Prof Suzy

Week 11: Practicing with Hypothesis Tests

Name: \_\_\_\_\_

## Instructions:

There are five questions in this worksheet. You will work with your group members to answer each question. Before getting started, take a moment and reflect on ways in which you can show your assigned group members respect. You may also view this initial list of examples that we will add to over the semester.

**Briefly**, in the space below, specify one way in which you will work to show your group members respect during today's lesson:

## Part 1: Proportions

### 1. Calculating probabilities for a proportion

The Centers for Disease Control and Prevention reports that 9.3% of surveyed high school students reported in 2015 that they had smoked cigarettes in the past 30 days. A college has 522 students in its freshman class. How likely is it that more than 10% of them are smokers?

### 2. Two-sided alternative Z-test for a proportion

A national vital statistics report indicated that about 3% of all births produced twins. Is the rate of twin births the same among very young mothers? Data from a large city hospital found that only 7 sets of twins were born to 469 teenage girls.

- Test an appropriate hypothesis and state your conclusion. Be sure the appropriate assumptions and conditions are satisfied before you proceed.
- What would a Type I error mean in this situation?

## Part 2B: Means

### 3. Calculating probabilities for a mean with the t-distribution

Organizers of a fishing tournament believe that the lake holds a sizable population of largemouth bass. They assume that the weights of these fish have a model that is skewed to the right with a mean of 3.5 pounds and a standard deviation of 2.2 pounds.

- Explain why a skewed model makes sense here.
- Explain why you cannot determine the probability that a largemouth bass randomly selected (“caught”) from the lake weighs over 3 pounds.
- Each fisherman in the contest catches 5 fish each day. Can you determine the probability that someone’s catch averages over 3 pounds? Explain.
- The 12 fishermen competing each caught the limit of 5 fish. What’s the probability that the total catch of 60 fish averaged more than 3 pounds?

### 4. One-sided alternative t-test

Suppose we purchase  $n = 6$  random bags of chips marked with a net weight of 35.4 grams. We then carefully weighing the contents in each bag to find the following weight data (in grams):

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chips = c(35.5, 35.3, 35.1, 36.4, 35.4, 35.5)
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- Is there evidence that the mean weight of these chip bags is less than advertised?
- What would a Type II error mean in this situation?

### 5. Two-sided alternative t-test

The National Perinatal Statistics Unit of the Sydney Children’s Hospital reports that the mean birth weight of all babies born in birth centers in Australia in a recent year was 3564 grams—about 7.86 pounds. A Missouri hospital reports that the average weight of 112 babies born there last year was 7.68 pounds, with a standard deviation of 1.31 pounds. We want to see if U.S. babies weigh the same, on average, as Australian babies.

- Why is this a one-sample test?
- If we believe the Missouri babies fairly represent American newborns, is there any evidence that U.S. babies and Australian babies do not weigh the same at birth?