

NAME:

R and/or Minitab along with a calculator may be used for this entire section. Once you have completed this section, e-mail Part II to Dr. Price at pricejr@etsu.edu, Dr. Lewis at lewiscn2@etsu.edu, and Dr. Hendrickson at hendricksonj@etsu.edu. Please make sure you e-mail it to all three professors.

The data in <http://faculty.etsu.edu/pricejr//1530/Spr17.csv> is needed to answer questions 1-3:

The data in the csv file is based on a student survey that asked the following questions:

- **GENDER:** Are you male or female? (Male, Female)
- **CHILDREN:** What do you think is the ideal number of children for a family to have?
- **MARRIED:** What is your opinion about a married person having sexual relations with someone other than the marriage partner? (Always wrong, Almost always wrong, Wrong only sometimes, Not wrong at all)
- **SEX:** There's been a lot of discussion about the way morals and attitudes about sex are changing in this country. What is your opinion about two people having sexual relations before marriage? (Always wrong, Almost always wrong, Wrong only sometimes, Not wrong at all)
- **PARTY:** What political party do you identify with? (Democratic, Republican, Independent, Other)
- **INCOME_TAX:** Should Tennessee implement a state income tax? (Yes, No)
- **SPANKING:** Do you strongly agree, agree, disagree, or strongly disagree that it is sometimes necessary to discipline a child with a good, hand spanking? (Strongly agree, Agree, Disagree, Strongly disagree)
- **DEATH_PENALTY:** Do you favor or oppose the death penalty for persons convicted of murder? (Favor, Oppose)
- **TV:** How many hours do you personally watch television including Netflix, Hulu Plus, Amazon Prime, etc... in a day?
- **DEVICES:** How many devices do you have that will allow you watch a TV show or movie (live, streaming, pre-recorded, online)?
- **PREPARING:** How many hours per 7-day week do you spend preparing for class (studying, reading, writing, doing homework or lab work, analyzing data, rehearsing, and other academic activities)?
- **SLEEP:** Usually, how many hours sleep do you get a night?
- **SHOES:** How many pairs of shoes do you own?

1. **SHOES:** [Question 13 from the](#) survey asked [students](#), "How many pairs of shoes do you own?"

a. Create an appropriate display for this variable and insert it here.

b. Which of the following best describes the shape of the distribution? [Underline or highlight](#) your answer.

Skewed left

Symmetric

Skewed right [Bimodal](#)

c. Calculate numerical measures appropriate for the shape of the distribution to describe the center and spread of **shoes**. Include appropriate output here.

i. Which statistic will you use to describe the center of the distribution? _____

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ii. What is the value of that statistic? _____

iii. Which statistic(s) will you use to describe the spread of the distribution?

iv. What is(are) the value(s) of that statistic? _____

d. Create a side-by-side boxplot to compare the distributions of **shoes** for **genders**. Insert the graph below.

e. Describe the distributions of **shoes** for the two groups and compare them.

f. Are there any outliers in each group? Identify them and justify your answers.

2. **SPANKING AND THE DEATH PENALTY:** Question 7 from the survey asked students “Do you strongly agree, agree, disagree, or strongly disagree that it is sometimes necessary to discipline a child with a good, hand spanking?” and Question 8 from the survey asked students “Do you favor or oppose the death penalty for persons convicted of murder?” We want to check if there is a relationship between the belief about spanking and the belief about the death penalty. Assume the students who took the class survey are from an SRS of ETSU students.

a. Create an appropriate graph to display the [relationship between SPANKING and DEATH PENALTY](#) and insert it here.

b. Create an appropriate two-way table to summarize the data and insert it here.

SUPPOSE WE SELECT ONE STUDENT AT RANDOM:

c. Find the probability that the student strongly believes in spanking a child and favors the death penalty for persons convicted of murder.

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- d. Find the probability that a student strongly disagrees in spanking a child or they oppose the death penalty for persons convicted of murder.
 - e. Find the probability that a student agrees in spanking a child given they favor the death penalty for persons convicted of murder.
 - f. Find the probability that a student favors the death penalty for persons convicted of murder given they agree in spanking a child.
 - g. Carry out a test for the hypothesis that there is no relationship between the belief about spanking a child and the belief about the death penalty of ETSU students. Use a significance level of $\alpha = 0.05$.
 - i. State the null and alternative hypothesis.
 - ii. Perform the test and include any output here.
 - iii. Which test statistic are you using and what is its value?
 - iv. State your decision and conclusion for the test.
 - v. Examine the data. Are the conditions for inference in part (ii) violated? Explain.
3. **TV:** A marketing analyst for a cable provider wishes to know if males or females watch more TV in order for the company's advertisements to target that specific gender. After talking to the company's current sales representatives across the US, he concludes that males watch more TV. Questions 9 from the survey asked students "How many hours do you personally watch television including Netflix, Hulu Plus, Amazon Prime, etc... in a day?" Assume that the students who responded the survey are a SRS of all ETSU students. Is there good evidence to support the idea that male students at ETSU watch more TV, on average, than female students?
- a. Create an appropriate graph to display the distribution of number of hours of TV watched in a day and insert it here.
 - b. Calculate a 95% confidence interval for the difference in the mean number of hours of TV watched in a day between male and female students. Interpret the confidence interval.

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- c. Perform an appropriate hypothesis test and include the output here.
- d. What is the value of the test statistic?
- e. What is the P-value for this test?
- f. State your decision and conclusion for the test using a significance level of $\alpha = 0.05$
- g. What assumptions are we making about the samples for our interpretation to be valid?

The data in <http://faculty.etsu.edu/pricejr//1530/ShoeHeight.csv> is needed to answer question 4.

4. **Shoe size versus height.** A person's height depends on several variables and one of them could be their shoe size. A survey asked students to input their U.S. shoe size (SHOE_SIZE) and their height (HEIGHT) in inches. Assume the respondents are an SRS of all ETSU students. We are interested in studying the relationship between a student's shoe size and their height.
 - a. Create an appropriate plot to display the relationship between **SHOE_SIZE** and **HEIGHT**. Insert the plot here.

Does the plot show a positive association, a negative association, or no association between these two variables? EXPLAIN what this means with respect to the variables being studied.
 - b. What is the correlation between the pair of variables? _____
 - c. Obtain the least squares regression equation for the pair of variables. Insert it here.
 - d. Interpret the value of the slope in the least squares regression equation you found in part (c).

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- e. Use the regression equation in part (c) to predict the height of a student who has a shoe size of 10.

- f. How well does the regression equation fit the data? Explain. Justify your answer with appropriate plot(s) and summary statistics.