**Print Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Math 127 – Exam 1 – Summer 2017**

**Version Wonder Woman**

**Oath: “*I will not discuss the exam contents with anyone on planet Earth until the answer key is posted to Blackboard.”***

**Sign Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**The penalty for cheating on this Exam is a grade of 0% for Math 127 Exam 1.**

**Student Instructions**

**1. This test is graded out of 100 points and counts for 20% of your Math 127 grade. Points are in parentheses for each question.**

**2. You can use a calculator, but you cannot use your phone. You can use the calculator on the computers if you wish.**

**3. You will need to use www.statcrunch.com. This is the only permitted webpage.**

**4. You are permitted to use one 8.5” by 11” sheet of notes, front and back. You will submit it with your test.**

**You may not use the pink sheet or copies of the pink sheet.**

**You must produce (handwritten or typed up) your own sheet of notes.**

**You may not use copies or scans of any instructor-created Math 127 content or answer keys.**

**5. Show work or points will be deducted. If you only report an answer and it is wrong, you will receive no credit.**

**1.** Use the “**Hospital Payments**” dataset for this one.

**1a. (3)** Variable type – C or I or Q?

\_\_\_\_\_\_\_\_ “***Provider ID***” \_\_\_\_\_\_\_\_ “***Provider Name***” \_\_\_\_\_\_\_\_\_\_ “***Provider State***”

\_\_\_\_\_\_\_\_ “***Provider Zip***” \_\_\_\_\_\_\_\_ “***Total Discharges***” \_\_\_\_\_\_\_\_\_\_ “***Illness***”

**1b. (2)** “***The Heart Hospital at Deaconess Gateway LLC***” has one entry. What row? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**1c. (2)** Which “***Provider Name***” has the most entries in the entire dataset?

“***Provider Name***”: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Number of Entries: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**1d. (2)** What is “***Maryland’s***” most frequent “***Illness***”? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**1e. (2)** Determine the mean “***Total Discharges***” for “***Diabetes***”: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**1f. (2)** Which “***Illness***” has the most “***Total Discharges***”? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**2. (5)** True or False. Write clearly, especially if you are a “**T**” or “**F**” person!

**2a.** \_\_\_\_\_\_\_\_\_\_ If every student in Math 127 earns a 100 on this exam, the standard deviation will be 100.

**2b.** \_\_\_\_\_\_\_\_\_\_ Lower fences can be negative.

**2c.** \_\_\_\_\_\_\_\_\_\_ The gold standard of all possible sampling methods is the convenience sample.

**2d.** \_\_\_\_\_\_\_\_\_\_ The value of the 96th percentile must be greater than the value of the 95th percentile.

**2e.** \_\_\_\_\_\_\_\_\_\_ “***Credit Card Debt***” for Cecil students is skewed right

**3. (4)** A Towson student has no “***Student Loan Debt***”. Presuming the mean is $13,506 and the standard deviation is $12,690.22, show the calculation to convert her “***Student Loan Debt***” to a *z*-score.

**4.** Use our “**Calendar Year 2017 Large Survey**” dataset to address the following questions.

**4a. (4)** Person #98 did not report their “***Commute***”. If their *z*-score was 0, solve for their “***Commute***”.

**4b. (5)** Describe the distribution of “***College Credits***”. Use bullet points for ease of grading.

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**4c. (5)** Discuss the independence or dependence of these two categorical variables: “***Global Warming***” vs. “***How Religious”.*** Make sure to support your claim with appropriate conditional percentages.

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**4d. (2)** \_\_\_\_\_\_\_\_\_\_\_ How many respondents are “***Race***” = “***White***”, “***Male***”, and ***at least 40-years old***?

**4e. (2)** Give the best measure of center for “***Sleep Hours***”? Mean / Median = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**4f. (2)** Give the best measure of spread for “***Online Time***”? SD / IQR = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**4g. (4)** Using the idea of *z*-scores, are the following data values unusual? Yes or No.

Person #65’s “***Work Time***”: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Person #90’s “***Online Time***”: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Person #148’s “***Commute***”: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Person #264’s “***Ideal Children***”: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**5.** Use the “**Calendar Year 2017 Library Data**” dataset for this one.

**5a. (4)** Calculate by hand the cutoffs to be an official low or high outlier for number of “***Pages***”. Show your work.

**5b. (2)** Now, for “***Length***”, how many official low or high outliers do we have?

Official Low Outliers: \_\_\_\_\_\_\_\_\_\_\_\_ Official High Outliers: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**5c. (4)** Interpret, with a sentence or two, the 74th percentile for “***Copyright***” year: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**5d. (4)** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Median “***Weight***” for all books

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Median “***Weight***” for book written by “***Males***”

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Median “***Weight***” for books with at least 500 “***Pages***”

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Median “***Weight***” for books written in the 1900s (whole century)

**5e. (2)** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ How many books had “***Copyright***” = 1977?

**5f. (2)** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ “***Title***” of the heaviest book

**5g. (4)** Thinking in terms of *z*-scores, give a range of values for what is not an unusual “***Thickness***”. Show work.

**6. (6)** During the last week, a few stolen credit cards have been floating around the Towson Town Center Shopping Mall. Police will take a sample of transactions paid for with credit cards and begin an investigation to track down the criminals.

For each scenario, identify the sampling method. **Pick from**: census, convenience, simple random, systematic, cluster, and stratified.

**6a.** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ There are 180 stores. Police draw three random stores out of a hat because their StatCrunch subscription expired: Brookstone, Forever 21, and Kay Jewelers. The officers then analyze every credit card transaction from those stores during the last week.

**6b.** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Officer Bardwell has a hunch that criminals shop at the Apple store, so he makes a request to analyze all the transactions from that store. Plus his genius brother works there, so it’ll be pretty easy to get all those credit card transactions.

**6c.** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Though it’ll be a ton of work, the whole team decides to take a sample of five random credit card transactions from each and every store.

**7.** We will run a designed experiment as such.

People convicted of drunk driving will be randomly assigned to one of three treatment groups: individual counseling sessions for 6 months, group counseling sessions for 6 months, or AA meetings for 6 months.

Additionally, half of all participants (randomly decided) will be required to put special license plates on their vehicles (nicknamed “Party Plates” in Ohio, it’s a real thing, sort of a public shaming / scarlet letter punishment. Google it later…).

**7a. (2)** If you were in charge, come up with a reasonable response variable to measure the outcome of this experiment.

Reasonable Response Variable: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**7b. (4)** Suppose we had a total of 36 participants in the experiment. Draw out a well-labeled tree diagram to show the factors, levels, treatments. Make it balanced.

**8.** Back to the “**Calendar Year 2017 Large Survey**” dataset. Give all answers as fractions, then as decimals rounded to four places and then convert the decimals to percentages rounded to the hundredths place.

**Example:** 42 / 97 = 0.4330 = 43.30%

**8a. (2)** Percentage of respondents who are “***Very Religious***”.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**8b. (2)** Percentage of “***Catholics***” who are “***Very Religious***”.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**8c. (2)** Percentage of respondents who “***Never***” use “***Facebook***” and “***Never***” use “***Instagram***”.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**8d. (2)** Percentage of respondents who are 67” tall or taller. Use “***Height***” in the “**Large Survey**”.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**8e. (2)** Percentage of respondents who are “***Catholic***” or “***Protestant***” or “***Christian***”.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**9.** For this one, use the “**US News National University Rankings**” dataset.

**9a. (2)** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Which “***IL = Illinois***” school has the largest “***Enrollment***”?

**9b. (2)** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 80th percentile for “***Tuition in-state***” for just “***Private***” schools

**9c. (2)** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Most common “***Freshmen Retention Rate”***

**9d. (2)** Percentage of “***TN = Tennessee***” schools that are “***Public***”.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**9e. (2)** Percentage of schools with at least 30,000 students.

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