**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Math 127 Exam 3 Summer 2015**

**Version G**

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

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

**Permitted Materials:** One-sheet of handwritten or typed notes. No copies of published materials.

No pink sheets or photocopies of pink sheets.

The datasets are found on [www.statcrunch.com](http://www.statcrunch.com). No other webpages.

Any calculator is permitted. Short bathroom breaks are permitted.

No cell phone calculators.

You must staple your sheet of notes to the exam.

* **Show all work when appropriate. StatCrunch provided numbers are OK always, but on sample sizes and minor algebraic calculations, support your answers.**
* Points are in parentheses for each problem.
* This test is graded out of 100 points and counts for 25% of your Math 127 grade.
* The graded exams are kept on file for at least one year and students are welcome to come see them whenever I am available in my office.
* An answer key will be posted on Blackboard shortly after the testing is completed.
* Exam grades will be posted to Blackboard by Monday, August 3rd (but possibly sooner). I will only be grading in one big swoop and only once all exams are completed and I pick them up Thursday, July 30th. If you take the exam early in the week, it will just sit in the math lab for a few days, FYI.
* Final grade announcements will be posted to Blackboard by Monday, August 3rd (but possibly sooner). Your numerical “Course Grade” on Blackboard is your final grade in Math 127 and you will know your letter grade based on my announcement.
* Letter grades will be posted to MyCecil, but students may see WIP for a few days.
* Good luck on this exam. Good luck in the future. It’s been my pleasure to work with you this semester.

**1. (2)** *t* = \_\_\_\_\_\_\_\_\_\_\_\_Give the *t* value for  if *n* = 6 data points, 99% confidence.

*z* = \_\_\_\_\_\_\_\_\_\_\_\_ Give the *z* value for  for 94% confidence.

**2.** Suppose the mean “***Credit Card Debt***” for **all** Cecil College students is $1730 with a standard deviation of $1480 and the shape of the distribution is very skewed right.

**2a. (2)** What is the minimum required sample size for the Normality of  to kick in? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**2b. (2)** Give the mean of : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**2c. (2)** Determine the standard deviation of  for sample sizes of *n* = 90. You can round to a whole number.

**2d. (2)** P(A random sample of 90 students has a mean “***Credit Card Debt***” exceeding $2000) = \_\_\_\_\_\_\_\_\_\_\_

**2e. (2)** Using a common rule of thumb, what would be an unusually low mean “***Credit Card Debt***” from an unbiased group of 90 Cecil College students? Show work.

**3.** A statistician created a confidence interval for the true proportion of all Marylanders who would vote for Donald Trump for President. The interval was (26.703% to 32.946%) and based on 1425 respondents.

**3a.** **(2)** How many in the sample said they’d vote for Trump? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**3b. (2)** What was the confidence level? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

No work is needed to be shown, but here is some space if you need it:

**4.**  Open up the “**ZZZ Retired - Calendar Year 2015 Large Survey**” dataset (piano). We would like to test if the mean “***TV Time***” is higher for males than it is for females. Presume the conditions are met.

**4a. (3)** Give the appropriate summary stats needed to run this test.

**4b. (2)** Hypotheses: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**4c. (4)** Give the test statistic and the P-value. Technology is OK, please uncheck “Pool Variances”.

Test Statistic: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ P-value: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**4d. (2)** Make a decision: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**4e. (2)** Write a conclusion in context.

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**4f. (2)**  Interpret the test statistic with a sentence in context.

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**4g. (2)** Interpret the standard error with a sentence in context.

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**4h. (2)** Interpret the P-value with a sentence in context.

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**5.** A linear regression equation was fit to the data in “**Roller Coasters**” on StatCrunch. “***Speed***” is in miles per hour. “***Drop***” is in feet.

**Simple linear regression results:**   
Dependent Variable: Speed  
Independent Variable: Drop   
Speed = 37.529503 + 0.18599121 Drop  
Sample size: 61  
R (correlation coefficient) = 0.92132219  
R-sq = 0.84883459  
Estimate of error standard deviation: 4.4083553

**5a. (2)** Predict “***Speed***” for a 195 foot drop: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**5b. (2)** Interpret the slope with a sentence in context: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**5c. (2)** Interpret *R*2 with a sentence in context: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**5d. (2)** Interpret *se* with a sentence in context: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**5e. (2)** Interpret the *y*-intercept with a sentence in context: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**6. (3)** The producers of ***Trainwreck***, starring Amy Schumer, rated R, want to estimate the mean age of people who come out to the theatre to see the movie. If they’d like to estimate the mean age to within 2 years with 99% confidence, how many people will they need to survey? You’ll need a reasonable estimate for the standard deviation, so use the  estimate as mentioned in class.

**7. (3)** Research shows 1/3 of all new marriages started online. Does that pattern hold in Cecil County? To start, we will need to collect a sample of marriages, but how many? Using 95% confidence and a margin of error of 5%, estimate the required sample size.

**8.** At Firebirds, 5% of all people order the salmon. Expecting *n* = 600 people over the weekend, answer the following questions.

**8a. (3)** Management will cook up the sampling distribution model for the proportion of people ordering salmon. Determine the mean and standard deviation of that model.

**8b. (3)** A news story breaks on Wednesday that salmon is no longer good for you. In fact, it is downright unhealthy. Using your model, determine the **number of salmon orders** over the weekend that would convince you statistically that fewer people are ordering salmon.

**9.**  Open up the “**ZZZ – Retired** **Calendar Year 2015 Personality Types**” dataset. We would like to test if less than half of all Cecil College “***Females***” are “***Extraverted***” = “***E***”. Conditions are met.

**9a. (2)** Hypotheses: H0: HA:

**9b. (2)** Give the value of the sample proportion, fraction and percentage: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**9c. (4)** Test Statistic: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

P-Value: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**9d. (2)** Decision: Reject H0 Fail to Reject H0

**9e. (2)** Write a conclusion in context: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**10.**  Open up the “**ZZZ Retired - Calendar Year 2015 Personality Types**” dataset. We would like to test if a higher proportion of “***Females***” at Cecil College are “***Feeling***” = “***F***” when compared to the “***Males***”.

**10a. (2)** Hypotheses: H0: HA:

**10b. (2)** Give the value of the sample proportion, fraction and percentage: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**10c. (4)** Test Statistic: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

P-Value: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**10d. (2)** Decision: Reject H0 Fail to Reject H0

**10e. (2)** Write a conclusion in context: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**10f. (2)**  If we made a mistake, what kind, and what would it imply, in the context of the problem?

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**11.** Use the “**ZZZ Retired - Calendar Year 2015 Large Survey**” dataset (piano) (last time, promise). Are students spending on average less than 10 hours per week “***Online Time***”?

**11a. (2)** Hypotheses: H0: HA:

**11b. (2)** Summarized Data:

**11c. (3)** What three conditions must be met to proceed with the hypothesis test? Explain if each is met. The variable is quantitative, so no need to go over that one.

Condition 1: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Condition 2: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Condition 3: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**11d. (2)** Test Statistic: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ P-value: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**11e. (2)** Decision using a 5% significance level: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**11f. (2)** Concluding remark using a 5% significance level: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**11g. (2)** Interpret a 95% confidence interval with a sentence in the context of the problem:

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**12. (2)** Explain what is meant by “statistical significance”.

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