**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Math 127 – Test 2A – Spring 2015**

**Oath: “*I will not discuss the exam contents with anyone until it is returned to me by my instructor*”.**

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

**The penalty for cheating on this exam is a final grade of F for Math 127.**

**Testing Center Staff Instructions**

**1. One sheet of handwritten or typed notes is OK.**

**Students may not use the “pink sheet” or any copied or scanned answer keys or Math 127 department documents.**

**2. Collect the sheet of notes and staple it to the test when submitted.**

**3. Testing Center issued TI calculator is OK.**

**4.** [**www.statcrunch.com**](http://www.statcrunch.com) **is required. All other webpages are prohibited.**

**5. Test must be completed in one sitting, but it is untimed. Very short bathroom breaks are permitted.**

**Student Instructions**

**1.** The Testing Center will issue you a TI-84 calculator. This is the only calculator permitted in the Cecil College Testing Center.

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

**3.** 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.

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

**Initial Below!**

**5.** Report all **probabilities** as decimals rounded properly to four places. Initial: \_\_\_\_\_\_\_\_\_\_\_\_\_

**Example:** 0.12367009 on your calculator is 0.1237

**6.** Report all **percentages** rounded properly to the hundredths place. Initial: \_\_\_\_\_\_\_\_\_\_\_\_\_

**Example:** 0.4555553 on your calculator is 45.56%

**Point Values:**

**7.** This test is weighted 60% probability, and 40% regression.

**8.** All questions on numbers 1 – 10 are worth 2 points each.

**9.** All questions on number 11 are worth 4 points each.

**Questions 1 – 10: Probability, 2 points each.**

**1.** Suppose 6 ounce bags of pretzels actually follow a *N*(6.15 oz, 0.12 oz) distribution (even though the bag of pretzels advertises its weight as 6 oz.) For this entire problem assume the bags of pretzels are labeled as 6 oz but actually follow *N*(6.15 oz, 0.12 oz).

**1a.** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ What percentage of bags of pretzels are actually under 6 ounces? Draw and label a picture.

**1b.** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_What is the probability that your bag of pretzels is within 0.10 ounces of what is printed on the bag? Draw and label a picture.

**1c.** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Determine *Q*3 for the ounces in a bag of pretzels. Draw and label a picture.

**1d.** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ If you buy 3 bags of pretzels, determine the probability that all 3

are over 6 ounces heavy. **Show calculation.**

**2.** The weight (in kilograms) of the Chinook salmon follows a Normal model, but suppose the mean weight is unknown. We do know that the standard deviation is 5.5 kg and only 2% of this species have weights that exceed 60 kg. Find the mean weight, showing all work below.

**3.** The time between 911 calls in a certain county follows an Exponentialdistribution with a mean of 27 minutes.

**3a.** Determine the 20th and 80th percentiles of this distribution. Draw and label a picture.

**3b.** Find *P*(Next call within the next 15 minutes): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**3c.** Presume calls are independent of each other. Determine the probability that it’s at least an hour until the next call, and then at least another hour until the call after that. Show calculation.

**4.** Suppose a certain Southwest Airlines flight to Cleveland follows a Uniform [–2, 13] distribution. Here *X* = –2 corresponds to the flight leaving 2 minutes early and *X* = 13 corresponds to the flight leaving 13 minutes late. *X* = 0 corresponds to the flight leaving exactly on time.

**4a.** Draw the probability distribution graph and clearly state the probability function *f*(*x*):

*f*(*x*) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**4b.** *P*(Flight leaves early) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**4c.** P(Flight leaves late) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**4d.** Presume this flight leaves every day of the week, and that days are independent of each other. Determine the probability that in the next seven days, at least one flight leaves early. Show calculation.

**4e.** What is the expected departure time? Show calculation.

**4f.** What is the 10th percentile of this distribution? Show calculation.

**5.** Use the following table to answer the following questions. Give **fractions** followed by the **decimal** answers rounded to **four decimals** if appropriate.

**Contingency table results:**   
Rows: Smoker  
Columns: Exercise

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Never | Rarely | Monthly | Weekly | Daily | Total |
| No | 30 |  |  | 42 |  | 253 |
| Yes |  | 21 |  | 7 | 0 |  |
| Total | 49 | 108 | 92 | 49 | 8 | 306 |

**5a.** Complete the contingency table. This does not correspond to a StatCrunch dataset, so don’t bother looking.

**If we randomly select one student, find:**

**5b.** *P*(Monthly | Nonsmoker) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**5c.** P(Weekly AND Smoker) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**5d.** P(Never OR Smoker) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**5e.** P(Nonsmoker | Rarely) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**6.** Your McDonald’s is running a contest on McMuffins. “***1 in 5 wins***” it says.

To be nice, you buy your whole 8:00 English 101 class of *n* = 13 students a McMuffin, with the express agreement that if anyone wins, it’s your prize.

Determine the probability that you win at least one time. Show calculation.

**7.** Give the *z*-score that corresponds to the 35th percentile for a Standard Normal model. Draw and label a picture.

**8.** Professor Kupe’s least favorite hockey player of all time is Sydney Crosby. Suppose the following table estimates the probabilities for the “***Number of Goals***” scored each game.



|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Goals** | **0** | **1** | **2** | **3** | **4** | **5** |
| **Probability** | **0.56** | **0.39** | **0.03** | **0.01** | **0.006** | **0.004** |

**8a.** *P*(At most one goal) **= \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**8b.** For any given game, how many goals do we expect Crosby to score? Show calculation.

**9.** Suppose Cecil College faculty salaries follow a Normal model with a mean $62,000 and a standard deviation of $6,200. Give the boundaries for salary that would capture the central 95% of all faculty.

**10.** A male is going to try online dating, and it is established that only 6% of male-written emails sent to females garner a response. Suppose this guy is going to write 20 emails this Saturday. Presume independence between the emails and use a Binomial model to answer the following questions.

**10a.** Poor guy. How many responses does he expect? Show work.

**10b.** Determine the standard deviation for the number of responses. Show work.

**10c.** Suppose this guy gets 5 responses. Explain why this is or isn’t unusual. Show work.

**10d.** *P*(At most 2 responses) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**10e.** *P*(At least 2 responses) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**10f.** Why is it inappropriate to use the Normal approximation to this Binomial model?

**Question 11: Regression, 4 points each.**

**11.** Use the “**Direct Loans**” dataset to answer the following questions using “***Number of Loans***” to predict “***Loan Value***” in $ dollars. Included in the dataset are 63 colleges and universities. “***Number of Loans***” is the total number of students loans a college granted during one particular quarter. “***Loan Value***” is the total dollar value of the loans granted.

**11a.** Describe the relationship between the two variables, hitting all the important points and **including** a measure of strength in your write up.

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**11b.** Determine the linear equation using StatCrunch. Explain why the *y*-intercept is meaningless in the context of this problem.

Equation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*y*-intercept: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**11c.** Interpret the value of the slope with a sentence in context. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**11d.** Interpret the value of *R*2 with a sentence in context. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**11e.** Interpret the value of *se*with a sentence in context. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**11f.** How many schools have unusual Studentized residuals and state how large a Studentized residual must be to be classified as “unusual”:

How Many: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ “Unusual” begins at: ±\_\_\_\_

**11g.** Calculate the Cook’s Distance that is “large”.

Large Cook’s Distance: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ How many schools exceed it: \_\_\_\_\_\_\_\_\_

**11h.** Interpret, in context, the residual (not the Studentized residual) for row 35, Medical College of Georgia.

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**11i.** If a school grants 2,545 loans, what is the expected “***Loan Value***”? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Show Calculation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**11j.** Using a residual plot, which condition for linear regression is suspect and why?

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