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

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

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

**The penalty for cheating on this exam is a final grade of F for Math 127 and severe disappointment by your instructor.**

**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. Student calculators are OK pending Testing Center rules.**

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

**2.** 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.

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

**4.** Attach your sheet of notes to this exam on the way out.

**5.** The answer key will post Wednesday night, July 1st at some point.

**6.** Exams graded and returned by Monday July 6th. Grades should post to BB earlier than that.

**7.** Enjoy the holiday weekend with no assignments except for getting those videos for Lesson 14 watched.

Good luck,

Professor Kupe

**Question 1: Regression, 4 points each.**

**1.** Use the “**Stat II Wal-Mart Supermarket**” dataset to answer the following questions.

**1a.** Describe the relationship between “***Walmart Price***” and “***Supermarket Price***”, hitting all the important points and include a measure of strength in your write up. We are predicting “***Supermarket Price***” for this entire problem. No need to compute Studentized residuals or Cook’s distances at this point – it will come later.

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**1b.** Determine the linear equation using StatCrunch. Explain why the *y*-intercept is meaningless in the context of this problem – do not just say “because it is meaningless” or “it is just a point on the line”.

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

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

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**1c.** For each dollar Wal-Mart increases a price, we’d expect the supermarkets to increase them by \_\_\_\_\_\_

Something that costs $3.99 at Wal-Mart is predicted to cost \_\_\_\_\_\_\_\_\_\_ at the supermarket.

The Kellogg’s Fruit Loops in row 11 is expected to cost \_\_\_\_\_\_\_\_\_\_\_ at the supermarket, based on the equation.

The equal spread condition is clearly met not met. (Circle)

**1d.** Interpret the value of *R*2 with a sentence in context. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**1e.** How many products have unusual Studentized residuals and state how large a Studentized residual must be to be classified as “unusual”:

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

**1f.** Calculate the Cook’s Distance that is “large”.

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

**1g.** Interpret, in context, the residual (not the Studentized residual) for The Cap’n Crunch Cereal in row 31.

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**1h.** Suppose a 3-pack of Orbit gum costs $2.49 at Walmart and $3.19 at the supermarket. Show the calculation to arrive at the residual. (This product is not in the dataset, so don’t search for it.)

**1i.** Interpret the estimate of error standard deviation with a sentence in context.

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**Questions 2 – 11: Probability, 3 points each.**

**2.** A stat professor always ends class early. The number of minutes class lets out from the proper time of 7:50 pm follows Uniform [–20, –5] distribution. Here *X* = –20 corresponds to class getting out 20 minutes early and *X* = –5 corresponds to class getting out 5 minutes early. *X* = 0 does not exist because he never goes the proper time and *X* cannot be positive because he never goes over the allotted time.

**2a.** Draw the probability distribution graph and clearly state the probability function *f*(*x*):

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

**2b.** *P*(Get out of class at least 10 minutes early) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**2c.** Expected number of minutes you will get out early:

**3.** The height of NBA basketball players follows a Normal model with a mean of 79 inches, but suppose the standard deviation is unknown. We do know that 5% of all NBA players are under 6 feet tall. Determine the standard deviation, showing the work below.

**4.** Life expectancy of a certain virus follows an Exponential distribution with a mean of 2 days.

**4a.** Determine the probability a virus lives at least a week. Draw the graph.

**4b.** Find P10 and P90. Draw the graph with both together labeled.

**4c.** Give a range of life expectancies that be the cutoffs for an unusually short or unusually long lifespan. The standard deviation of the probability model is ½.

**5.** Below is the historical grade distribution for Math 127 students.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Grade | A | B | C | D | F |
| Probability | 0.24 | 0.31 | 0.16 | 0.15 | 0.14 |

**5a.** Determine the probability at least one student fails (Grade of F) in a class of 20 students. Show calculation.

**5b.** Three students are randomly selected – what’s the chance all three earned Cs?

**6a.** Give the *z*-score that corresponds to the 1st percentile for a Standard Normal model: \_\_\_\_\_\_\_\_\_\_\_\_\_

**6b.** Give the *z*-score that puts 8% of the area in the upper tail of Standard Normal model: \_\_\_\_\_\_\_\_\_\_\_\_\_

**7.** Suppose the starting salary for a bachelor’s degree of chemical engineering is $65,713 with a standard deviation of $5,550 and that a Normal model applies. Professor Kupe negotiates a $75,000 starting salary. Is that unusually good? Why or why not?

**8.** Number of strikes thrown in a game by Professor Kupe’s favorite PBA bowler Walter Ray Williams, Jr. is given by the following discrete probability table:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Strikes** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| **Probability** | **0.04** | **0.09** | **0.46** | **0.30** | **0.09** | **0.015** | **0.005** |



**8a.** *P*(At least 8 strikes) **= \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**8b.** *P*(At most 6 strikes) **= \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**8c.** *P*(Two games in a row with at least 10 strikes)**:**

**8d.** Expected number of strikes:

**9.** Suppose that 42% of Cecil College students have seen Rocky I, and 25% have seen Rambo I. Of those who have seen Rambo I, 80% have also seen Rocky I. Draw a well-labeled Venn diagram.

**10.** We have a Binomial probability model with *n* = 15 and *p* = 0.50. You could think of this as flipping a fair coin 15 times and counting up the number of heads.

**10a.** Determine the mean:

**10b.** Determine the standard deviation:

**10c.** P(All heads) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**11.** Suppose faculty at Cecil College have IQ scores that follow a Normal model with an unknown mean and a standard deviation of 15 points. All 52 faculty members take an IQ test and 25% of them score 100 or below. Determine the mean IQ for all Cecil College faculty members.

**12. (1 point)** If a randomization test for a statistically significant correlation were set up, what is the null hypothesis in all cases?

H0: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_