**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Math 127 – Test 2 A – Fall Late Start 2014**

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

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

There are 33 questions on this test, each worth 3 points. You get one point for printing your name.

**1.** Suppose Professor Kupe’s weekly expenditure at Aldi’s follows a N($65.25, $10.45) model. Week-to-week purchases are independent of each other.

**1a.** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ What percentage of weeks does he spend more than $75?

**1b.** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ What is the probability that he spends between $50 and $60?

**1c.** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Determine the 95th percentile for weekly expenditures.

**1d.** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Take his next 3 weeks. What is the probability that he spends more than $75 all three weeks? Show calculation.

**1e.** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ What is the chance, during the next 52 weeks, he spends more than $100 at least once? Show calculation.

**1f.** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Last week his expenditure had a *z*-score of –0.99. How much did he spend? Show calculation.

**2.** Heights of the male faculty at Cecil College follow a Normal model with a mean of 70.5” and an unknown standard deviation. We know that 10% of the male faculty are 74” inches or taller. Determine the standard deviation and show work.

**3.** Suppose arrivals at the Cecil College cashier window follow an Exponential model with a mean of 6 minutes.

**3a.** Determine the 20th, 50th, and 80th percentiles for this model.

P20 = \_\_\_\_\_\_\_\_\_\_\_\_\_ P50 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_ P80 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**3b.** P(Next arrival takes more than an hour) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**3c.** P(Next arrival in the next 30 seconds) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**4.** LeBron James historically has made 74.8% of his free throws. Suppose in an NBA playoff game, he goes to the foul line 15 times. Presume each free throw attempt is independent of the previous one. If you need a basketball primer, just ask Professor Kupe.

4a. How many free throws do we expect King James to make? Show calculation. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4b. What is the standard deviation of this probability model? Show calculation. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4c. P(Bron Bron makes at least 12 free throws) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4d. P(The Akron Hammer makes all 15 free throws) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4e. Give a range of values for free throws made that would not be unusual. Show calculation.

**5.** Suppose that the time a professor ends class before or after the official end of class time follows a Uniform [-4, 6] distribution. Here X = -4 corresponds to the professor ends the class four minutes early, X = 6 corresponds to the professor ends class six minutes late and X = 0 corresponds to the professor ended class at the official end of call time.

**5a.** Draw the probability distribution graph and clearly state the probability function f(x):

f(x) =

**5b.** P(Class ends before the official end of class time) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**5c.** What is the mean of this distribution? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**6.** Use the “**Body Fat**” dataset to answer the following questions using “***Waist (inches)”*** to predict “***Body Fat %***”.

**6a.** 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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**6b.** Determine the equation of the line of best-fit for this dataset. Explain why the *y*-intercept is meaningless in the context of this problem.

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

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

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**6c.** Interpret the value of the slope with a sentence in context. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**6d.** Interpret the value of *R*2 with a sentence in context. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

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**6e.** Interpret the value of *se*with a sentence in context. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**6f.** How many observations have unusually large Studentized Residuals and state how large a residual must be to be classified as “unusual”:

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

**6g.** State what value Cook’s distance must exceed to be unusual and how many observations exceed this number.

How Many: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ What value must it exceed? \_\_\_\_\_\_\_\_\_\_

**6h.** One person with a waist size of 35 inches was left out of this data. Predict his or her Percent of Body Fat. Now, ***if*** this person had 21.7% body fat what is the value of the residual?

**Predicted value:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Residual:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**6i.** Find the value of the residual of the person in the 19th row and interpret it in context.

**Residual:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Interpretation:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**6j.** What graph besides the scatter plot do we need to look at to see if the equal spread assumption is met and circle if it is met?

**Graph** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **Is it met?** (Circle) Yes No Can’t Tell

**6k.** Describe just the distribution of the variable “***Body Fat %***” hitting on all four points mentioned in Unit 1.

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

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**6l.** Besides the histogram what other graph should we look at to see if “***Body Fat %***”is Normal and circle if it is Normal?

**Graph** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **Is it normal?** (Circle) Yes No Can’t Tell

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

**Contingency table results:**   
Rows: Smart Phone  
Columns: Text and Drive

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | All the time | Never Ever | Occasionally | Total |
| No | 0 | 27 | 6 | 33 |
| Yes | 19 | 108 | 146 | 273 |
| Total | 19 | 135 | 152 | 306 |

**7a.** P(Occasionally Text and Drive | Own a Smart Phone) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**7b.** P(Do Not Own a Smart Phone | Never Ever Text and Drive) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**7c.** P(Do Not Own a Smart Phone and Never Ever Text and Drive) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**8.** The following table represents the number of students that arrive to campus, per 20 minutes, at the Math Lab.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Number of Students | 0 | 1 | 2 | 3 | 4 | 5 |
| Probability | 0.01 | 0.15 | 0.20 | 0.30 | 0.25 | 0.09 |

**8a.** P(At most 3 students) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**8b.** P(At least 3 students) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**8c.** Determine the expected number of students. Show work.