MATH 154, Final Exam, Part I, Spring 2019 Name KEY

Instructions: This portion of the exam is to be answered based on your Excel work that you completed at home. Submit this document with your answers along with the Excel file upon which the answers are based. Part II of the exam will be completed in class.

To complete this portion of the exam, you will need the Excel file **154final_data.xlsx** also posted in Blackboard. You should perform any calculations in Excel, and then write your answers to the bolded questions directly in the Word document. You may need to copy and paste graphs here as well.

1. Using the data on Sheet 9, complete the following: (b-f: 4 points each)
   a. Make a scatterplot of the midterm and final exam score data with midterms on the horizontal axis and final exams on the vertical axis. Add a descriptive title and axis labels. Be sure to adjust the axes to eliminate as much unnecessary white space as possible. Add a linear trendline, find the regression equation and R^2.

   b. **Report the regression equation.**

   $Y = 0.997X + 0.9079$

   c. **Report the correlation value and the coefficient of determination.**

   $R^2 = 0.5795$ $r = 0.761281$

   d. **Is the correlation positive or negative?**

   positive

   e. **Is the correlation strong, moderate or weak?**

   strong or moderately strong

   f. **Does the relationship in the scatterplot appear to be linear or nonlinear?**

   linear

2. Using the data on Sheet 10, Calculate a complete set of descriptive statistics for years of education. Report the following below.
   a. **Mean and standard deviation.** (6 points)

mean 5.06 st.dev 2.839

b. **Five-number summary.** (6 points)

min 0 Median 5 Max 12
1st Q 4 3rd Q 6

c. **Range and mode.** (4 points)

range 12 mode 4

3. Using the same data on Sheet 10, make a histogram of education. Label your graph appropriately with axis labels and a descriptive title. **Describe the shape of the graph: is it symmetric, left skewed, right skewed or some other shape?** (5 points)

right skewed

4. Using the same data on Sheet 10, make a boxplot. **Does the boxplot support your description of the skew or symmetry above? Explain why or why not.** (5 points)

The skew is not strong, there is a right outlier but it is less noticeable by far (no, is okay)

5. On Sheet 11, make a pivot table of the data of drinking and smoking levels. Note that the coding is N=non, O=occasional, H=high, S=smoking, D=drinking. **Copy the table below.** (6 points)

	HD	ND	OD	Grand Total
HS	733	163	552	1448
NS	733	2118	2061	4912
OS	899	435	1067	2401
Grand Total	2365	2716	3680	8761

6. The standard deviation of the speed of 86 vehicles on a certain highway is 13.4 mph. **Find the standard error if** $SE = \frac{SD}{\sqrt{n}}$. (5 points)

1.44

7. The formula for the standard score is $Z = \frac{x-\mu}{\sigma}$. The mean height of women is 64" with a standard deviation of 3.1", and the mean height of men is 70" with a standard deviation of 3.5". Richard is 6'2" and Pamela is 5'11". **Which of them is taller for their gender? Explain.** (8 points)

Pamela is taller
She is further from mean

8. Using the data on Sheet 10, **find the 80th percentile of education from the data.** (5 points)

7

9. Using an amortization table or a built-in financial formula in Excel, **find the amount in a savings account** if it collects 2.1% interest, compounded daily, for 18 years, if a $3 deposit is made every day. (6 points)

$23,951.67

10. Using the data on Sheet 11, make a summary table of drinking data, and make a bar graph of it. Label it appropriately and **write a sentence that summarizes what it tells you.** (6 points)

Occasional drinkers are most common

11. Using the data on Sheet 11, make a summary table of the smoking data and make a pie graph of it, and label it appropriately. **What percent of the sample consider themselves non-smokers?** (6 points)

56%

Excel Work: (30 points)

MATH 154, Final Exam, Part II, Spring 2019 Name KEY

Instructions: This portion of the exam is to be answered entirely in class without Excel. You may use a calculator, but it may not be on a device that connects to the Internet. Round answers to two decimal places unless the question asks for a different number of places.

1. Employees are surveyed and a scatterplot of the relationship between total experience (work experience plus education) is plotted against salary. A linear regression line is found, and the equation and coefficient of determination is on the graph. Use this graph to answer the questions that follow.

a. State the slope of the regression line and interpret it in the context of the problem. (5 points)

817.43

for each increase in experience by one "year", the salary increases by $817.43.

b. State the y-intercept and interpret it in the context of the problem. (5 points)

23,479

if one has no experience, one can expect the base salary to be $23,479

c. If a new employee has a total of 5 years of experience credits (one year on the job plus a 4-year degree), what kind of salary can they expect according to the regression line? (5 points)

817.43(5) + 23,479 = $27,566.15

d. What is the proportion of the variability in salary that can be explained by total experience? (5 points)

60.43%

2. What values are used to create a boxplot? (4 points)

5 # Summary

3. A table of unit conversions is shown below. Use it to perform the following unit conversions. (4 points each)

Length
SI unit : meter (m)

1 km = 0.62137 mi
1 mi = 5280 ft
= 1.6093 km
1 m = 1.0936 yd
1 in = 2.54 cm (exactly)
1 cm = 0.3937 in

Temperature
SI unit : Kelvin (K)

0 K = −273.15°C
= −459.67°F
K = °C + 273.15
°C = $\frac{5}{9}$(°F − 32°)
°F = $\left(\frac{9}{5} \times °C\right) + 32°$

a. Convert 927 kilometers to miles

927 * 0.62137 = 576 m.

b. Convert −40°C to degrees Fahrenheit

$\frac{9}{5}(-40°) + 32 = -40°F$

4. A screenshot below shows a small dataset, sample size 10. Based on the information shown, write the Excel formulas you'd need to calculate the requested values. (5 points each)

	AF	AG	AH	AI	AJ	AK
1		20				
2		22				
3		26				
4		23				
5		24				
6		18				
7		32				
8		24				
9		31				
10		28				
11						

a. What formula would be needed to find the median of the data?

=MEDIAN(AG1:AG10)

b. What formula would be needed to find the 75th percentile?

=PERCENTILE(AG1:AG10, 0.75)
or 75%)

5. Under what circumstances is it better to use a median as a measure of central tendency than the mean? (4 points)

When the data is strongly skewed

6. Shown below is a pivot table of Gender, and whether or not the person lives alone. Use the table to answer the questions that follow. (5 points each)

	Column Labels		
Row Labels	**No**	**Yes**	**Grand Total**
Female	332	66	398
Male	379	79	458
Grand Total	**711**	**145**	**856**

a. If a person is randomly selected from the data, what is the probability that the person is female?

$398/856 = 199/428 = 46.5\%$

b. What is the probability that the person lives alone? (Yes)

$145/856 = 16.9\%$

c. What is the probability that the person lives alone and is a woman?

$66/856 = 33/428 = 7.7\%$

d. What is the probability that the person lives alone or is a woman?

$$\frac{398 + 145 - 66}{856} = \frac{477}{856} = 55.7\%$$

e. What is the probability that the person lives alone given that they are female?

$66/398 = 33/199 = 16.6\%$

7. Translate the logical and mathematical notation $\exists x(x^2 = 1)$. Then find the value of x. (6 points)

there exists an x such that $x^2 = 1$

$X = \pm 1$

8. The screenshot below shows how scientific notation appears in Excel. Write this number in standard scientific notation as it appears in normal mathematical notation and not in "computer" formatting. (4 points)

	U	V	W
1			
2			
3		3.17E-05	
4			

3.17×10^{-5}

9. The 30th percentile of heights of men in the United States is approximately 68.2" or 5'8.2". What does this statement mean in plain English? (5 points)

30% of men are shorter than (or equal to) 5'8.2" tall

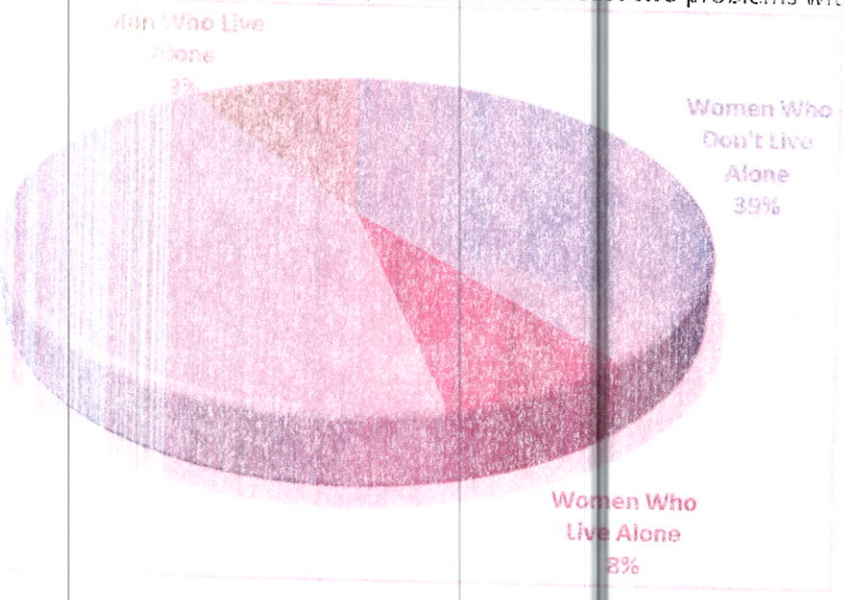
10. Using the screenshot of an Excel sheet below to write a formula that will evaluate the expression $\frac{A-B^2}{C+\sqrt{D}}$ using the cell references where the values are in the sheet. (8 points)

	A	B	C	D	Formula
4	13	16	13	8	

assuming columns have same labels as variables

= (A4 − B4^2)/(C4 + SQRT(D4))

11. Explain why the graph below is a bad graph. There are at least two problems with it. (8 points)



the perspective can be misleading to the eye

the graph has no title