MATH 154, Exam #2, Part I, Spring 2021   Name _____ **KEY** _____

Instructions: This portion of the exam is based on the questions below using the Excel file **154exam2data.xlsx** and the questions below. The answers to these questions will be entered into the Canvas Exam #1 Part 1 as numerical, true/false, multiple choice or multiple answer type questions. This portion of the exam must be submitted electronically in Canvas and the computer will autograde the solutions.

After completing this exam, also submit you work and answers for Part 2 in the Part 2 submission folder. The second portion of the exam will be for written questions and submitted other types of Excel-related work such as graphs. The second part of the exam will be graded by hand. Both parts of the exam must be completed.

1. Using the data on Sheet 7, Calculate a complete set of descriptive statistics for car value. Report the following below.
    a. **Mean and standard deviation.** (6 points)

    $\$5906.40$ = mean
    $\$5532.99$ St.dev

    b. **Five-number summary.** (10 points)

    min = 90   Q1 = 2125   Median = 4180
                          Q3 = 7780, Max = 33,750

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

    range = 33660
    mode = 1210

2. **What does the × in a boxplot represent?** (3 points)

    mean

3. On Sheet 8, the number of accidents reported on the job and their likelihood is listed. Find the weighted average of this data, treating the category greater than or equal to 9 as just 9. **Report below the value you find. What is the average number of accidents reported?** (6 points)

    1.11   1.11

4. The standard deviation of Income is $43,631 for a sample of 723 incomes. **Find the standard error if $SE = \frac{SD}{\sqrt{n}}$.** (5 points)

$ 1622.65

5. The formula for the standard error for a proportion is $SE = \sqrt{\frac{p(1-p)}{n}}$. If 945 people have tried the lasagna in a sample of 1344, **what is the standard error for the proportion found?** (5 points)

0.012462

6. 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, since her z-score is higher

7. A sample of 240 people is taken and their weights measured. A histogram of the data is shown below. Based on the graph, describe the shape of the distribution, and state the modal class. (6 points)

Weights
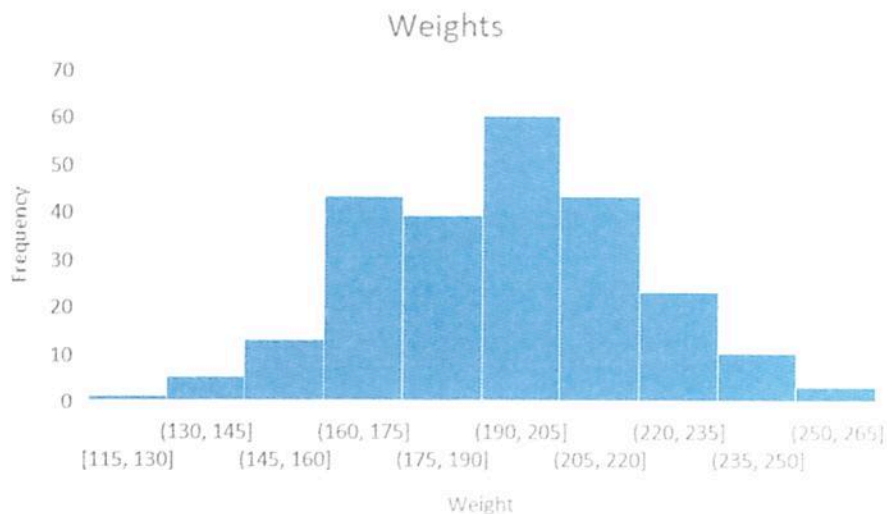
roughly symmetric

modal class is (190, 205]

8. A 1/8 scale model of a house made of a revolutionary plastic uses 0.55 cubic meters of the new material. How much of the new material is needed for the full-size structure if the plastic is used for all of the same elements as in the model? (6 points)

$$0.55(8^3) = 281.6$$

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

Temperature
SI unit : kelvin (K)

$0 K = -273.15°C$
$= -459.67°F$
$K = °C + 273.15$

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)
$1 cm = 0.3937 in$

$$°C = \frac{5}{9}(°F - 32°)$$

$$°F = \frac{9}{5}°C + 32°$$

a. Convert 792 miles to kilometers

$$792 \times 1.6093 = 1274.57$$

b. Convert 279 miles to inches

$$279 \times 5280 \times 12 = 17,677,440$$

c. Convert 56°C to degrees Fahrenheit

$$132.8°F$$

10. The standard score for Aleyah's temperature test is $z = -3.1$. If the mean of the test is 97.4°F and has a standard deviation of 0.5°F. The observation value can be found by rearranging the standard score equation to be $x = \mu + z\sigma$. What is Aleyah's temperature according to the test? (5 points)

$$97.4 - 3.1(0.5) = 95.85$$

11. A probability distribution is shown below. Use it to answer the questions that follow. (3 points each)

x	0	1	2	3	4	5	6	7
$p(x)$	4%	11%	31%	8%	19%	11%	9%	7%

a. $P(x = 4)$ 19%

b. $P(x < 3)$ 46%

c. $P(x \geq 6)$ 16%

d. $P(2 < x < 5)$ 27%

e. $P(x > 7)$ 0

f. $P(x \leq 2 \ OR \ x \geq 7)$ 53%

MATH 154, Exam #2, Part II, Spring 2021   Name _____ **KEY** _____

Instructions: For this portion of the exam, answer the questions in words or by creating graphs or tables in Excel. You will be asked to submit your work (scan this portion of the exam or compile photo images of the pages in a single document), and you will be asked to submit your Excel work file. You will only be able to submit two files to the Canvas Exam #2 Part 2.

If you need data for the exam, use the same file as you used for Part 1: **154exam2data.xlsx.**

Academic Integrity Statement

I affirm that, I, _____ (student name), do attest that I alone am completing the problems on this test without receiving unauthorized assistance. I understand that violations of academic integrity may result in sanctions, up to and including expulsion from the college.

_____(Student Signature)

_____(Student ID number)

Attach a copy of your photo ID to the online submission (there is a question drop box for it). The ID must be a photo ID. A Driver's license, School ID (NOVA or otherwise), or a work ID are acceptable as long as it contains your full name and photo.

1. Using the same data on Sheet 7, make a histogram of car value. 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?** (6 points)

right skewed

2. Using the same data on Sheet 7, make a boxplot. **Does the boxplot support your description of the skew or symmetry above? Explain why or why not.** (6 points)

yes, longer tail on large end, all outliers on the high side

mean is larger than the median

3. On Sheet 8, **does the data provided represent a probability distribution? Explain your reasoning.** (4 points)

yes, probabilities add to 1

4. Create a simulation in Excel that will model 100 rolls of a 20-sided die whose sides are numbered 1-20. Freeze a copy of the simulation, and **report the average outcome of the rolls, and the proportion of rolls that resulted in a 9.** (10 points)
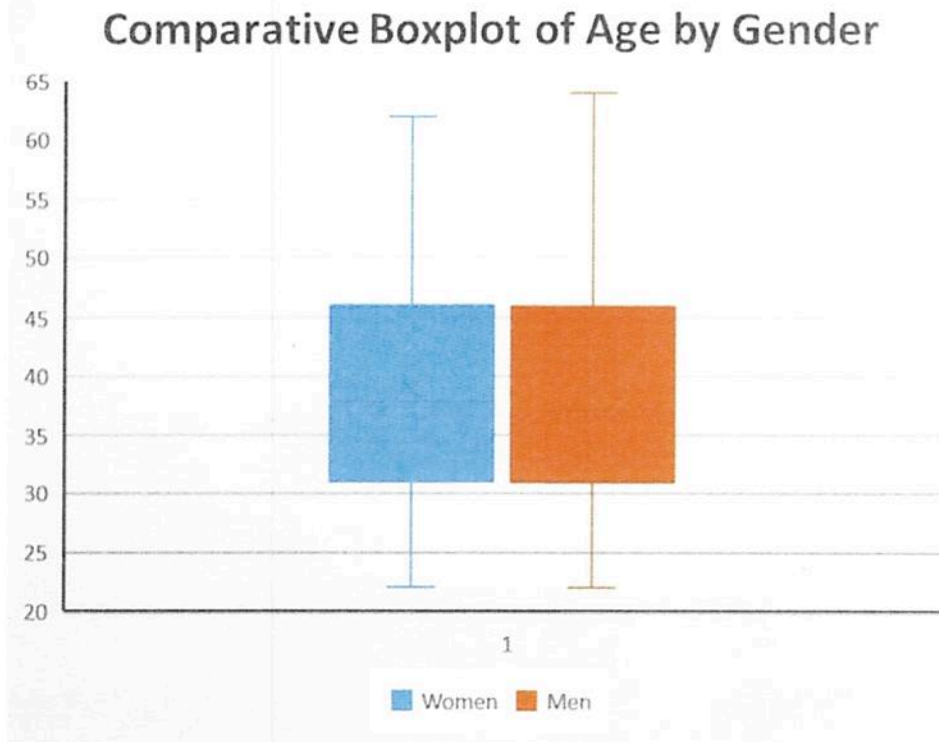
average = 10.49

prop of 9's = $\frac{3}{100}$

answers will vary

5. What does it indicate for the skewness of a histogram if the mean is higher than the median? (3 points)

right skewed

6. A boxplot comparing the ages of men and women in a sample is shown. Describe any differences you notice between the ages of men and women according to the graph. (5 points)

Comparative Boxplot of Age by Gender

Women ■ Men

men are slightly older than the women (the max age)
men slightly more right skewed
median age for women slightly higher than men

7. 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. (4 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 mean of the data?

=AVERAGE (AG1 : AG10)

b. What formula would be needed to find the sample standard deviation?

= STDEV(AG1:AG10)

c. What formula would be needed to find the population standard deviation?

=STDEV.P(AG1:AG10)

8. When a standard deviation value is requested and the problem does not specify whether to calculate the sample or population standard deviation, which one should you assume? (3 points)

Sample

9. Three coins are flipped and the outcome of each flip is recorded as either H or T. What are all the possible outcomes of the three flips? (6 points)

HHH
HHT
HTH
THH
HTT
THT
TTH
TTT