Math 175 – Spring 2018

Assignment: G16 and Final Exam Review part I

1. *True or False (circle):*

   a. If the 80th percentile for US household income in 2009 was $100,000, then the 40th percentile was $50,000.
   TRUE FALSE

   b. The second quartile is the mean.
   TRUE FALSE

   c. In a normal distribution, roughly 2/3 of all data values will lie within one standard deviation of the mean.
   TRUE FALSE

   d. The total area under the standard normal distribution is 1.
   TRUE FALSE

   e. If $r > 0$, then the data are significantly positively correlated.
   TRUE FALSE

2. *Fill in the blanks:*

   a. When computing a confidence interval for μ where we know σ, we use the z distribution when $n \geq 30$ and the t distribution when $n < 30$.

   b.

   c. When computing a confidence interval for p, we use the z distribution.

   d. When computing confidence intervals for σ, we use the χ^2 distribution.

   e. When doing a hypothesis test for μ where we know σ, we use the z distribution when $n \geq 30$ and the t distribution when $n < 30$.

   f. When doing a hypothesis test for p, we use the z distribution.

   g. When doing a hypothesis test for σ, we use the χ^2 distribution.

3. Classify each of the variables by circling the appropriate term in each category below.

Glossary:

Qual = Qualitative	N = Nominal
Quant = Quantitative	O = Ordinal
Disc = Discrete	I = Interval
Cont = Continuous	R = Ratio

	Qual or Quant?	Disc or Cont?	Level of Measurement
Weights of cars:	Qual – Quant	Disc – Cont	N – O – I – R
Relationship Status:	Qual – Quant	Disc – Cont	N – O – I – R
Letter Grade:	Qual – Quant	Disc – Cont	N – O – I – R
Bathtub Capacity (gal):	Qual – Quant	Disc – Cont	N – O – I – R

4. *Data Analysis*

Identify any outliers in the data, and then draw a boxplot.

Q_1 Q_2 Q_3

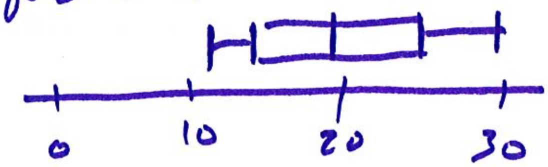
12 14 14 15 16 19 22 24 25 28 29

$IQR = 25 - 14 = 11$

$Q_1 - 1.5\,IQR = 14 - 1.5(11) = {}^{-}2.5$

$Q_3 + 1.5\,IQR = 25 + 1.5(11) = 41.5$

No outliers



5. *Probability & Probability Distributions*

1. What is the probability that a PA license plate (format: 3 letters, 4 numbers) has three repeated letters and four digits in sequential order (for example: JJJ-4567)?

$$26 \times 7 \Big/ 23^3 \times 10^4$$

2. In a game of Hearts with five players, two cards are removed from the deck: 2♠ and 2♦. Then, each player is dealt ten cards.

   What is the probability that a player is dealt a hand with four Aces?

$$1 \times {}_{46}C_6 \Big/ {}_{50}C_{10}$$

   What is the probability that a player is dealt a hand with five Aces?

$$0$$

Approximately 10.3% of American high school students drop out before graduating.

- What is the probability that 10 high school students from a random sample of 25 will drop out before graduating?

$${}_{25}C_{10}\,(0.103)^{10}(0.897)^{15} \approx 0.000\,086$$

- Find the expected value of the number of eventual drop-outs in a random sample of 25 high school students.

$$0.103 \times 25 \approx 2.5$$

[2 or 3]

6. *Confidence Intervals*

a. In a sample of 18 tailgating Steeler Fans, the average number of beers consumed before kickoff was 4.3 with a sample standard deviation of 1.2. Find a 95% confidence interval for the true mean number of beers consumed by all tailgating Steeler Fans.

$$4.3 \pm (2.110)\left(\frac{1.2}{\sqrt{18}}\right) \Rightarrow (3.7, 4.9)$$

b. A survey of 150 two-inch diameter pipes made in the same factory had a standard deviation equal to 0.08 inches. Compute a 98% confidence interval for the standard deviation of all pipes made in that factory.

$$\left(\sqrt{\frac{149(0.08)^2}{135.807}}, \sqrt{\frac{149(0.08)^2}{70.065}}\right) \Rightarrow (0.083, 0.117)$$

7. *Hypothesis testing*

a. A group of 25 cyclists did a long ride together. After the ride they checked their handlebar computers and the sample mean was 51.4 miles. The standard deviation of such computers is known to be 0.15 miles. Is there sufficient evidence at significance level α = 0.05 to suggest that the loop was longer than 50 miles?

$$z = \frac{51.4 - 50}{0.15/\sqrt{25}} \approx 46.7 \Rightarrow$$ Reject H_0

Yes, there is!

b. It is said that 85% of NFL players will have a "short" career of less than 5 seasons. Of the 1696 players in the NFL, 1476 of them have been playing for less than 5 years. Is the actually proportion likely to be higher than 85%? State a maximum confidence level.

$$z = \frac{1476/1696 - 0.85}{\sqrt{\frac{0.85(0.15)}{1696}}} \approx 2.34$$ Yes, 99.04%

8. *Correlation/Regression*

Using the data from a survey of 25 drivers, the correlation coefficient between the ages of the driver (x) and the number of accidents in a 1-year period (y) is – 0.6476. The regression equation for the two variables is
$y = -0.0578x + 3.8205$

a. Is this a significant correlation? YES NO

b. If so, predict the number of annual accidents that a 50-year-old person should expect.

$$-0.0578(50) + 3.8205 \approx 0.9305$$

[about 1]