Name: **Math Academy I Classwork 9**

9-A Normal Distributions

1. IQ scores are normally distributed with $\mu = 100$ and $\sigma = 15$.

a) What is the z score of an IQ score of 90?

b) What percent of IQ scores are below 90?

c) What is the probability that a random person has an IQ below 90?

d) At what percentile is an IQ score of 90?

e) What percent of IQ scores are between 90 and 106?

f) What percent of IQ scores are between 90 and 94?

9-B The Central Limit Theorem

2. State whether the following would be more likely in a random sample of 20 Americans or 120 Americans.

a) The majority have blonde hair.

b) The average age is below 25.

c) The majority own smartphones.

d) The average IQ is between 96 and 102.

3. Given IQ scores are normally distributed with $\mu = 100$ and $\sigma = 15$, calculate the following probabilities.

a) 20 random scores average between 96 and 102.

b) 120 random scores average between 96 and 102.

9-C *P* Values

4. Avery hypothesizes that colors are easier to distinguish than shapes. She gives participants a stack of cards, each of which has a triangle, a square, a circle, or a hexagon on it. Each shape is red, blue, green, or yellow. Using counterbalancing, she has each participant sort the deck by shape and also by color, and times each trial.

sort by shape (seconds to complete):	16.2	11.9	14.6	10.3	19.4
sort by color (seconds to complete):	14.2	10.5	13.9	10.9	16.3

a) Calculate $\bar{x}$ and s for the differences.

b) Calculate z.

c) Calculate p.

d) What, exactly, is the p value a probability of?

e) Are the data statistically significant?

f) What should Avery conclude?

g) What is the probability that Avery made a type I error?

h) What is the probability that Avery made a type II error?

9-D Types of Statistical Tests

5. State the type of test that would be best suited for the given research questions.

a) Do middle school students spend more time outdoors than high school students do?

b) Do people tend to spend less time outdoors the more time they spend on social media?

6. In a random sample of 80 students, the 31 athletes have an average GPA of 3.36 with standard deviation 0.49, and the 59 nonathletes had an average GPA of 3.20 with standard deviation 0.58.

a) What is the null hypothesis for a one-tailed test?

b) Use a graphing calculator to calculate t and p.

d) State the conclusion, followed by t and p.

9-E Spreadsheet Data Analysis

7. Develop an index for readiness Math Academy 2.

a) State the factors you would include.

b) Specify the range of values of each of the factors listed above, so they can be entered into a spreadsheet.

c) Come up with a formula that incorporates all of the factors above in a way that you feel gives each appropriate importance compared to the others. Code this formula into a spreadsheet cell, and copy the formula so that it can apply to multiple entries.

8. Set up an r test of a correlation to see if your index can be used to predict fall semester Math Academy 2 grades.

a) Enter data into the spreadsheet for students in this class to calculate the value of the index for each student.

b) How large does the sample need to be to reject H_0 if the sample correlation coefficient is $r = .50$?

c) State what the conclusion would be if $r = .50$ for your sample.

d) After next semester, enter fall semester Math Academy 2 grades into the spreadsheet, calculate r and p, make a conclusion about your the effectiveness of your index for predictions, and make any suggestions for changing the weights or components in the index.