Name: _____ **Date:** _____

Answer the following questions to practice using what you've learned. Print this test. Then, write your responses in the space provided. Scan or take a picture of your completed test, upload it to your computer (as a .pdf or .jpg file) and submit the assignment to the appropriate dropbox.
No credit will be given to answers without sufficient supporting evidence/work.

1. **Consider the following Scenario:** A Frozen Yogurt Store collected data on yogurt sales for two months. They data they collected is represented in the two matrices below: (14 points *total*)

	July		
	Just Yogurt	With Nuts	With Sprinkles
One Flavor	44	78	84
Two Flavor Swirl	100	117	170

	August		
	Just Yogurt	With Nuts	With Sprinkles
One Flavor	37	74	108
Two Flavor Swirl	153	158	172

a. Add these matrices. Label the new matrix, "Matrix S". Using a complete sentence with proper spelling, grammar, punctuation, and capitalization, describe what matrix S represents (in terms of the Frozen Yogurt Store). Don't forget to label each of the rows and columns of matrix S. (5 points)

b. How many sales included only one flavor of frozen yogurt? Using a complete sentence with proper spelling, grammar, punctuation, and capitalization, describe how to use matrix S to answer this question. (2 points)

c. Using a complete sentence with proper spelling, grammar, punctuation, and capitalization, identify what element s_{22} represents. (2 points)

d. Add all the elements in the third column of matrix S. Using a complete sentence with proper spelling, grammar, punctuation, and capitalization, identify what this sum represents. (2 points)

e. Write a matrix that represents how many more sales the store had in August than in July. Show all your work. Don't forget to label each of the rows and columns of the answer matrix. (3 points)

No credit will be given to answers without sufficient supporting evidence/work.

2. The first matrix shows the cost of two types of frozen yogurt products (in cents), and the second matrix shows the number of each type sold during different months: (9 points *total*)

$$\begin{array}{c} \text{Cost} \\ \text{(in cents)} \end{array} \begin{array}{cc} \text{One} & \text{Two} \\ \text{Flavor} & \text{Flavor} \\ & \text{Swirl} \end{array} \quad [599 \quad 649]$$

$$\begin{array}{c} \text{One} \\ \text{Flavor} \end{array} \quad \begin{array}{c} \text{Two} \\ \text{Flavor} \\ \text{Swirl} \end{array} \begin{array}{cccc} \text{June} & \text{July} & \text{August} & \text{September} \\ \begin{bmatrix} 195 & 206 & 219 & 199 \\ 354 & 387 & 483 & 421 \end{bmatrix} \end{array}$$

a. Using a complete sentence with proper spelling, grammar, punctuation, and capitalization, answer this question: (2 points)

Can these two matrices be multiplied?

If the two matrices *cannot* be multiplied, identify how you know they cannot be multiplied.

If the two matrices *can* be multiplied, identify how you know they can be multiplied. Include the dimensions the product matrix should have, and how you know.

b. Multiply the matrices. Show all your work. Label the new matrix, "Matrix *M*". Don't forget to label each of the rows and columns of the answer matrix. (4 points)

c. Using a complete sentence with proper spelling, grammar, punctuation, and capitalization, identify how much more money was spent on frozen yogurt in August than in June? Include an explanation about how you used the answer to part b to find the answer to this question. (3 points)

No credit will be given to answers without sufficient supporting evidence/work.

3. Use Cramer's rule to solve the system of equations using the following steps: (14 points *total*)

$$\begin{cases} 2x + 5y = 1 \\ -3x + 4y = -13 \end{cases}$$

a. Rewrite the system of equations as a multiplication of matrices. $AX = B$; where A is the coefficient matrix, X is the variable matrix, and B is the constant matrix. (4 points)

b. Calculate the determinant of A, if it exists. Show all your work. Do not use decimals or mixed numbers. (2 points)

c. There are multiple versions of Cramer's rule (p.583, 584 in the textbook). Write the version of Cramer's rule that is appropriate for this system of equations (written only with variables). Then, substitute appropriate values for the variables, but do not solve. Recall that Cramer's rule is identifying the location where these two lines intersect, therefore, be sure to write the equation in proper point notation, (x, y). (3 points)

d. Solve the equation you gave as your answer to part c. Show all your work. Write your answer in proper point notation. Do not use decimals or mixed numbers (reduce fractions when necessary). (5 points)