MATH 11 PRACTICE QUIZ SECTIONS 2.1 - 2.4

① Solve the system of linear equations using the Gauss Jordan Elimination Method
Show your work for all row operations (show instructions and the resulting matrix) at each step, until you reach reduced row echelon form to find the solution

$$\begin{aligned} 6x - 6y + 30z &= 24 \\ 3x + 2y + 5z &= 7 \\ 5x - 2y + 15z &= 5 \end{aligned}$$

② Solve the system of linear equations by writing the system as a matrix equation and using the inverse to solve.
Show the following work:

- Write the system as a matrix equation. Show all the matrices
- Write the inverse matrix (use your calculator to find it)
- Show the matrix algebra needed to solve
- Find the solution

$$\begin{aligned} x + 3y &= 20 \\ 2x + y + z &= 40 \\ 3x + 4y + 2z &= 30 \end{aligned}$$

③ For the following systems of equations, use your calculator to find reduced row echelon form for the augmented matrix. Then state whether each system has
A) 1 unique solution B) No Solution or C) Infinitely Many Solutions

SYSTEM ①

$$\begin{aligned} 4x + 3y + 15z &= -3 \\ 2x + y + 11z &= -9 \\ 5x + 2y + 31z &= -30 \end{aligned}$$

SYSTEM ②

$$\begin{aligned} 7x - 21z &= 175 \\ 10x + 3y + 2z &= 54 \\ 4x + 8y + 2z &= -66 \end{aligned}$$

SYSTEM ③

$$\begin{aligned} x + 3y + 2z &= 8 \\ 5x + 6y + z &= 2 \\ 14x + 24y + 10z &= 32 \end{aligned}$$

For the system that has infinitely many solutions find the values of x, y, z for three different specific solutions

④ Do the following matrix operations or explain why the operations are not possible

$$A=\begin{bmatrix} a & b & c & d \\ 2 & -1 & 3 & 0 \end{bmatrix} \quad B=\begin{bmatrix} 7 & 5 \\ -8 & 4 \end{bmatrix} \quad I=\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

a) Find AB b) Find BA c) Find B^2 d) Find 3B

e) Find 4A − 2B f) Find IA

⑤

$$C=\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix} \quad D=\begin{bmatrix} -1 & 2 & 6 \\ 10 & 5 & 0 \end{bmatrix} \quad E=\begin{bmatrix} -1 & 0 \\ 3 & 1 \\ 2 & 4 \end{bmatrix} \quad G=\begin{bmatrix} 7 & 10 \\ 8 & 11 \\ 9 & 12 \end{bmatrix}$$

a) Find the dimensions of DE
b) Find the dimensions of ED
c) Find the dimensions of CD
d) Find the dimensions of DC
e) Find the dimensions of EG

Note a-e: If the product does not exist, explain why

⑥ A bakery makes bread, cookies, and muffins in both regular and gluten free varieties.

- Matrix Q shows the quantities of each product that were sold yesterday.
- Matrix T shows the quantities of each product that were sold today.
- Matrix P shows the prices: $4 for a load of bread, $0.50 for a cookie, $2.00 for a muffin. Prices are the same for regular and gluten free versions of items at this bakery.
- Tomorrow they plan to make 20% more of each regular type bakery item than they sold today but only half as many of each gluten free item as they sold today. These production planning factors are shown in matrix F.

$$Q=\begin{array}{c} \\ \text{Regular} \\ \text{Gluten Free} \end{array}\begin{array}{c} \begin{matrix} \textit{Bread} & \textit{Cookie} & \textit{Muffin} \end{matrix} \\ \begin{bmatrix} 60 & 120 & 75 \\ 15 & 30 & 25 \end{bmatrix} \end{array} \qquad T=\begin{array}{c} \\ \text{Regular} \\ \text{Gluten Free} \end{array}\begin{array}{c} \begin{matrix} \textit{Bread} & \textit{Cookie} & \textit{Muffin} \end{matrix} \\ \begin{bmatrix} 55 & 130 & 65 \\ 12 & 36 & 20 \end{bmatrix} \end{array}$$

$$P=\begin{bmatrix} 4 \\ 0.50 \\ 2 \end{bmatrix} \qquad F=\begin{bmatrix} 1.20 & 0.50 \end{bmatrix}$$

a. Find matrix product QP and write the product. Then use it to state the total revenue from sales of regular baked products and the total revenue from sales of gluten free baked products.

b. Find matrix T−Q. Interpret the change in sales from yesterday to today for each item.

c. Find the total expected revenue (for all products combined) from tomorrow's planned production as matrix product FTP.