Name: KEY Date:

# Math 1050 PRACTICE Quiz (12.2-12.4)

1. (2 points) Simplify: $4\begin{bmatrix}-1 & 2\\ 3 & -4\end{bmatrix} - 2\begin{bmatrix}2 & 4\\ 6 & -8\end{bmatrix}$

$$\begin{bmatrix}-4 & 8\\ 12 & -16\end{bmatrix} - \begin{bmatrix}4 & 8\\ 12 & -16\end{bmatrix} = \boxed{\begin{bmatrix}-8 & 0\\ 0 & 0\end{bmatrix}}$$

2. (4 points) Let $A = \begin{bmatrix}1 & 2 & 3 & 4\\ -1 & 0 & -4 & 3\\ 2 & 2 & 1 & -1\end{bmatrix}$. Some row operation(s) have been applied to $A$ to obtain $\begin{bmatrix}1 & 2 & 3 & 4\\ -1 & 0 & -4 & 3\\ 0 & -2 & x & y\end{bmatrix}$. What are the values of $\boldsymbol{x}$ and $\boldsymbol{y}$?

$R_3 = -2r_1 + r_3$ so $x = -2(3)+1 = -6+1 = -5$

$y = -2(4)+(-1) = -8+(-1) = -9$

$$\boxed{x = -5,\ y = -9}$$

3. (5 points) Using Cramer's Rule to find $x$, where $x = \frac{D_x}{D}$, for the following system of equations:

$$\begin{cases} x + 4y - 3z = 0\\ 3x - y + 3z = 0\\ x + y + 6z = 0 \end{cases}$$

$$D = \begin{vmatrix}1 & 4 & -3\\ 3 & -1 & 3\\ 1 & 1 & 6\end{vmatrix} = 1\begin{vmatrix}-1 & 3\\ 1 & 6\end{vmatrix} - 4\begin{vmatrix}3 & 3\\ 1 & 6\end{vmatrix} + (-3)\begin{vmatrix}3 & -1\\ 1 & 1\end{vmatrix}$$

$$1(-6-3) - 4(18-3) - 3(3+1)$$

$$= 1(-9) - 4(15) - 3(4) = -9 - 60 - 12 = -81$$

$$Dx = \begin{vmatrix}0 & 4 & -3\\ 0 & -1 & 3\\ 0 & 1 & 6\end{vmatrix} = 0 - 4\begin{vmatrix}0 & 3\\ 0 & 6\end{vmatrix} + (-3)\begin{vmatrix}0 & -1\\ 0 & 1\end{vmatrix}$$

$$= 0 - 4(0-0) - 3(0-0) = 0$$

$$x = \frac{Dx}{D} = \frac{0}{-81}$$

$$\boxed{x = 0}$$

4. (7 points) Let $A = \cancel{\begin{bmatrix} 1 & -1 & 1 \\ 0 & -2 & 1 \\ -2 & -3 & 0 \end{bmatrix}}$. Find inverse, $A^{-1}$. **change to :** $A = \begin{bmatrix} 1 & 0 & 2 \\ -1 & 2 & 3 \\ 1 & -1 & 0 \end{bmatrix}$

$$\left[\begin{array}{ccc|ccc} 1 & 0 & 2 & 1 & 0 & 0 \\ -1 & 2 & 3 & 0 & 1 & 0 \\ 1 & -1 & 0 & 0 & 0 & 1 \end{array}\right] \xrightarrow[R_3 = r_2 + r_3]{R_2 = r_1 + r_2} \left[\begin{array}{ccc|ccc} 1 & 0 & 2 & 1 & 0 & 0 \\ 0 & 2 & 5 & 1 & 1 & 0 \\ 0 & 1 & 3 & 0 & 1 & 1 \end{array}\right] \xrightarrow{r_2 \leftrightarrow r_3}$$

$$\left[\begin{array}{ccc|ccc} 1 & 0 & 2 & 1 & 0 & 0 \\ 0 & 1 & 3 & 0 & 1 & 1 \\ 0 & 2 & 5 & 1 & 1 & 0 \end{array}\right] \xrightarrow{R_3 = -2r_2 + r_3} \left[\begin{array}{ccc|ccc} 1 & 0 & 2 & 1 & 0 & 0 \\ 0 & 1 & 3 & 0 & 1 & 1 \\ 0 & 0 & -1 & 1 & -1 & -2 \end{array}\right] \xrightarrow{R_3 = -1r_3}$$

$$\left[\begin{array}{ccc|ccc} 1 & 0 & 2 & 1 & 0 & 0 \\ 0 & 1 & 3 & 0 & 1 & 1 \\ 0 & 0 & 1 & -1 & 1 & 2 \end{array}\right] \xrightarrow[R_1 = -2r_3 + r_1]{R_2 = -3r_3 + r_2} \left[\begin{array}{ccc|ccc} 1 & 0 & 0 & 3 & -2 & -4 \\ 0 & 1 & 0 & 3 & -2 & -5 \\ 0 & 0 & 1 & -1 & 1 & 2 \end{array}\right]$$

$$\boxed{A^{-1} = \begin{bmatrix} 3 & -2 & -4 \\ 3 & -2 & -5 \\ -1 & 1 & 2 \end{bmatrix}}$$

5. (7 points) Solve the following system of equations using matrices (row operations). **No points will be given if the solution is found through trial and error or using another method.**

$$\begin{cases} x - y + z = -4 \\ 2x - 3y + 4z = -15 \\ 5x + y - 2z = 12 \end{cases}$$

$$\left[\begin{array}{ccc|c} 1 & -1 & 1 & -4 \\ 2 & -3 & 4 & -15 \\ 5 & 1 & -2 & 12 \end{array}\right] \xrightarrow[R_3 = -5r_1 + r_3]{R_2 = -2r_1 + r_2} \left[\begin{array}{ccc|c} 1 & -1 & 1 & -4 \\ 0 & -1 & 2 & -7 \\ 0 & 6 & -7 & 32 \end{array}\right] \xrightarrow{R_2 = -1r_2} \left[\begin{array}{ccc|c} 1 & -1 & 1 & -4 \\ 0 & 1 & -2 & 7 \\ 0 & 6 & -7 & 32 \end{array}\right] \xrightarrow{R_3 = -6r_2 + r_3}$$

$$\rightarrow \left[\begin{array}{ccc|c} 1 & -1 & 1 & -4 \\ 0 & 1 & -2 & 7 \\ 0 & 0 & 5 & -10 \end{array}\right] \xrightarrow{R_3 = \frac{1}{5}r_3} \left[\begin{array}{ccc|c} 1 & -1 & 1 & -4 \\ 0 & 1 & -2 & 7 \\ 0 & 0 & 1 & -2 \end{array}\right]$$

$x - y + z = -4 \rightarrow x - 3 - 2 = -4 \rightarrow x = 1$

$y - 2z = 7 \rightarrow y - 2(-2) = 7 \rightarrow y = 3$

$z = -2$

$\boxed{(1, 3, -2)}$