AA – Matrix Review

Name:_____ Hr:___

1. Represent the following system of equations with matrices

$3x - 4y = 10$

$5y - 2x = 20$

$$\begin{bmatrix} 3 & -4 \\ 5 & -2 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 10 \\ 20 \end{bmatrix} \quad \text{OR} \quad \left[\begin{array}{cc|c} 3 & -4 & 10 \\ 5 & -2 & 20 \end{array}\right]$$

2. Mulitply the following matricies: ROW · COLUMN

$$\begin{bmatrix} 2 & 3 & 7 \\ -2 & 5 & 0 \end{bmatrix}\begin{bmatrix} 7 & 10 \\ -1 & 3 \\ 2 & 1 \end{bmatrix} = \begin{bmatrix} 25 & 36 \\ -19 & -5 \end{bmatrix}$$

3. Find $[A] \cdot [B]$. Show how to calculate at least two of the entries in the answer matrix by hand.

$$A = \begin{bmatrix} 2 & 3 & -1 \\ 0 & 4 & 5 \end{bmatrix} \quad B = \begin{bmatrix} 4 & 9 \\ -3 & 8 \\ 2 & -2 \end{bmatrix} \quad C = \begin{bmatrix} 9 & 5 & 0 \\ 6 & -3 & 1 \end{bmatrix}$$

$$[A] \cdot [B] = \begin{bmatrix} -3 & 44 \\ -2 & 22 \end{bmatrix}$$

4. Find $2[A] - 3[C]$. Show how to calculate at least two of the entries in the answer matrix by hand.

$$2[A] - 3[C] = \begin{bmatrix} 4 & 6 & -2 \\ 0 & 8 & 10 \end{bmatrix} - \begin{bmatrix} 27 & 15 & 0 \\ 18 & -9 & 3 \end{bmatrix} = \begin{bmatrix} -23 & -9 & -2 \\ -10 & 17 & 7 \end{bmatrix}$$

5. For the matricies above, which number is A_{23}? Which number is C_{12}?

IN #3

MATRIX [C] 1ST ROW, 2ND COLUMN = 5

MATRIX [A] 2ND ROW, 3RD COLUMN = 5

6. Solve the following matrix equation for [x] using matrix inverse (by hand)

$$\begin{bmatrix} 3 & 7 \\ -6 & 5 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -2 \\ -34 \end{bmatrix}$$

$$[A][X] = [B]$$

$$[A]^{-1}[A][X] = [A]^{-1}[B]$$

$$[X] = [A]^{-1}[B]$$

$$[A]^{-1}[A] = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} A & B \\ C & D \end{bmatrix}\begin{bmatrix} 3 & 7 \\ -6 & 5 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$5(3A - 6B = 1) \quad 5(3C - 6D = 0)$$

$$6(7A + 5B = 0) \quad 6(7C + 5D = 1)$$

$$57A = 5 \qquad 57C = 6$$

$$A = \frac{5}{57} \approx 0.088 \qquad C = \frac{6}{57} \approx 0.11$$

$$\therefore B = \frac{-7}{57} \approx -0.123 \qquad \therefore D = \frac{3}{57} \approx 0.0053$$

$$[A]^{-1} = \begin{bmatrix} \frac{5}{57} & \frac{-7}{57} \\ \frac{6}{57} & \frac{3}{57} \end{bmatrix}$$

$$\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} \frac{5}{57} & \frac{-7}{57} \\ \frac{6}{57} & \frac{3}{57} \end{bmatrix}\begin{bmatrix} -2 \\ -34 \end{bmatrix}$$

$$X = \frac{-10}{57} + \frac{238}{57} = \frac{228}{57} = 4$$

$$Y = \frac{-12}{57} - \frac{102}{57} = \frac{-114}{57} = 2$$

1ST 2ND

7. Use the provided matrices below and specify which combinations can be multiplied together, then indicate the dimensions (rows x columns) of the resulting matrix (don't actually calculate)

$A=\begin{bmatrix}1&2\\-3&1\end{bmatrix}$ $B=\begin{bmatrix}11&-1\\4&3\end{bmatrix}$ $u=\begin{bmatrix}1\\7\end{bmatrix}$

$C=\begin{bmatrix}2&1&3\\4&1&7\end{bmatrix}$ $D=\begin{bmatrix}-1&0&4\\3&1&1\end{bmatrix}$ $v=\begin{bmatrix}3\\-2\end{bmatrix}$

$E=\begin{bmatrix}1&-1\\-2&0\\1&-2\end{bmatrix}$ $F=\begin{bmatrix}-5&2\\-1&3\\4&-4\end{bmatrix}$ $w=\begin{bmatrix}2\\1\\-2\end{bmatrix}$

$G=\begin{bmatrix}1&0&1\\3&-1&-2\\0&2&-1\end{bmatrix}$ $H=\begin{bmatrix}1&2&3\\2&3&1\\3&1&2\end{bmatrix}$

$x=[2\ -1\ 1\ -2]$, $y=[-3\ 2\ 1\ -6]$

[A] → [B] 2×2

[A] → [U] & [V] 2×1

[B] → [U] & [V] 2×1

[D] & [C] → [E] & [F] 2×3

[W] 2×1

[G] & [H] 3×3 → [E] & [F] 3×2

[W] 3×1

[E] & [F] → [A] & [B] 2×2

[U] & [V] 3×1

8. Solve this matrix using the determinant method $[A]^{-1}=\frac{1}{ad-bc}\begin{bmatrix}d&-b\\-c&a\end{bmatrix}$

$[A]^{-1}=\frac{1}{63}\begin{bmatrix}3&6\\-9&3\end{bmatrix}$

$[A]^{-1}=\begin{bmatrix}\frac{3}{63}&\frac{6}{63}\\\frac{-9}{63}&\frac{3}{63}\end{bmatrix}$

$\begin{bmatrix}3&-6\\9&3\end{bmatrix}\begin{bmatrix}x\\y\end{bmatrix}=\begin{bmatrix}24\\30\end{bmatrix}$

$\begin{bmatrix}x\\y\end{bmatrix}=\begin{bmatrix}\frac{3}{63}&\frac{6}{63}\\\frac{-9}{63}&\frac{3}{63}\end{bmatrix}\begin{bmatrix}24\\20\end{bmatrix}$

9. Solve for p and q:

$\begin{bmatrix}1&4&q\\9&p^2&2\end{bmatrix}\begin{bmatrix}10\\2\\4\end{bmatrix}=\begin{bmatrix}q^2\\100\end{bmatrix}$

$10+8+4Q=Q^2$

$18+4Q=Q^2$

$0=Q^2-4Q-18$

$Q=\frac{4\pm\sqrt{16+72}}{2}$

$Q\approx 6.7$ & $Q\approx -2.7$

$90+2P^2+8=100$

$2P^2+98=100$

$2P^2=2$

$P^2=1$

$P=\pm 1$

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