

FINITE MATH, FALL 2016 - PROBLEM SET

Name: _____

Use this worksheet as the cover sheet for your write-up: write your name on this page, and staple this sheet to the front of your homework packet.

You will receive no credit for submitting solutions that the grader cannot read and understand—be sure to write legibly!

Problem 1. Use row reduction to solve the following system of equations:

(1)

$$\begin{aligned}x + y &= 5 \\ 3x + 12y &= 12\end{aligned}$$

(2)

$$\begin{aligned}x + y &= 7 \\ 4x + 3y &= 22\end{aligned}$$

(3)

$$\begin{aligned}2x + 3y &= 9 \\ 4x + 6y &= 7\end{aligned}$$

(4)

$$\begin{aligned}2x - 2y &= -5 \\ 2y + z &= 0 \\ 2x + z &= 7\end{aligned}$$

Problem 2. Find the values of the variables in each of the equations that will make the equality hold.

(1)

$$\begin{bmatrix} 3 & 4 \\ -8 & 1 \end{bmatrix} = \begin{bmatrix} 3 & x \\ y & z \end{bmatrix}$$

(2)

$$\begin{bmatrix} s-4 & t+2 \\ -5 & 7 \end{bmatrix} = \begin{bmatrix} 6 & 2 \\ -5 & r \end{bmatrix}$$

Problem 3. Perform the indicated operations. If not possible, explain why.

(1)

$$\begin{bmatrix} 2 & 4 & 5 & -7 \\ 6 & -3 & 12 & 0 \end{bmatrix} + \begin{bmatrix} 8 & 0 & -10 & 1 \\ -2 & 8 & -9 & 11 \end{bmatrix}$$

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(2)

$$\begin{bmatrix} 1 & 3 & -2 \\ 4 & 7 & 1 \end{bmatrix} + \begin{bmatrix} 3 & 0 \\ 6 & 4 \\ -5 & 2 \end{bmatrix}$$

(3)

$$\begin{bmatrix} -4x + 2y & -3x + y \\ 6x - 3y & 2x - 5y \end{bmatrix} + \begin{bmatrix} -8x + 6y & 2x \\ 3y - 5x & 6x + 4y \end{bmatrix}$$

Problem 4. Using the matrices $O = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$, $P = \begin{bmatrix} m & n \\ p & q \end{bmatrix}$, $T = \begin{bmatrix} r & s \\ t & u \end{bmatrix}$,

$X = \begin{bmatrix} x & y \\ z & w \end{bmatrix}$, verify each of the following statements:

- (1) $X + T = T + X$
- (2) $X + (T + P) = (X + T) + P$
- (3) $X - X = O$
- (4) $P + O = P$

Problem 5. Find each matrix product, if possible. If not explain why.

- (1) $\begin{bmatrix} 2 & -1 \\ 5 & 8 \end{bmatrix} \begin{bmatrix} 3 \\ 2 \end{bmatrix}$
- (2) $\begin{bmatrix} 2 & -1 & 7 \\ -3 & 0 & -4 \end{bmatrix} \begin{bmatrix} 5 \\ 10 \\ 2 \end{bmatrix}$
- (3) $\begin{bmatrix} 6 & 0 & -4 \\ 1 & 2 & 5 \\ 10 & -1 & 3 \end{bmatrix} \begin{bmatrix} 1 \\ 2 \\ 0 \end{bmatrix}$

Problem 6. Using the matrices $P = \begin{bmatrix} m & n \\ p & q \end{bmatrix}$, $T = \begin{bmatrix} r & s \\ t & u \end{bmatrix}$, $X = \begin{bmatrix} x & y \\ z & w \end{bmatrix}$, verify each of the following statements:

- (1) $(PX)T = P(XT)$
- (2) $P(X + T) = PX + PT$
- (3) $(k+h)P = kP + hP$, for real numbers k and h .

Problem 7. Let $A = \begin{bmatrix} 1 & 2 \\ -3 & 5 \end{bmatrix}$, $x = \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$, and $B = \begin{bmatrix} -4 \\ 12 \end{bmatrix}$, show that the equation $Ax = B$ represents a linear equation of two unknowns. Solve the system and substitute your result into the matrix equation to check your answer.