

**MATH 2130 LINEAR ALGEBRA**  
**WEEK 3 QUIZ**  
**2025 SEPTEMBER 15**

PROBLEM P1-1

For which values of  $k$  are there no solutions, many solutions, or a unique solution to the system

$$3x + 2y = 4$$

and

$$-9x - 6y = k + 1?$$

PROBLEM P1-2

Use Gauss's method to find the unique solution to the system

$$2x - y + z = 3,$$

$$-6x + 6y - 6z = 6,$$

and

$$-5x - 4y - 4z = 0.$$

PROBLEM P2-1

Find the reduced echelon form of the matrix

$$\begin{bmatrix} -2 & -1 & -6 & -4 \\ 5 & 4 & 3 & 4 \\ 1 & 2 & -9 & -4 \end{bmatrix}.$$

PROBLEM P2-2

Use Gauss-Jordan reduction to solve the system

$$-2x_1 - 2x_2 = -2,$$

$$-5x_1 - 3x_2 - 5x_3 = -3,$$

and

$$-3x_1 - 2x_2 - 3x_3 = -3.$$

PROBLEM S1

Describe the set of points on the plane through  $(2, 3, 1, 6)$ ,  $(1, 0, -2, 3)$ , and  $(4, -1, -1, 0)$  in  $\mathbb{R}^4$ . Does the origin lie on this plane? (Use the method we saw in class. Even if you know the cross product method, it won't work in  $\mathbb{R}^4$  anyway.)

PROBLEM S2

Find the angle between the vectors  $(1, -3, 9, 1)$  and  $(2, 4, -1, 1)$  in  $\mathbb{R}^4$ .