

Math 236 - Assignment 2

January 28, 2026

Name _____

Score _____

Show all work to receive full credit. Supply explanations when necessary. Do all computations by hand unless otherwise indicated. This assignment is due February 4.

1. For human beings, show that “has the same blood type” is an equivalence relation.
2. For any integers m and n , we will say that $m \sim n$ if and only if $m - n$ is an integer multiple of 7. Prove that \sim is an equivalence relation.
3. For positive integers p and q , we will say that $p \sim q$ if and only if p is an integer multiple of q . Prove that \sim is NOT an equivalence relation.
4. Let $y_1(x) = \cos x$ and $y_2(x) = \sin x$. Prove that a linear combination of three linear combinations of y_1 and y_2 is a linear combination of y_1 and y_2 .
5. Find (by hand) the reduced row echelon form (RREF).

$$\begin{pmatrix} 1 & 1 & 1 & 4 & 4 \\ 2 & 3 & 4 & 9 & 16 \\ -2 & 0 & 3 & -7 & 11 \end{pmatrix}$$

6. Write the system as an augmented matrix. Then compute the RREF and determine the solution set. You may use technology to find the RREF.

$$\begin{array}{rrrrrrrcl} 2x_1 & - & 3x_2 & + & x_3 & - & 3x_4 & + & 2x_5 & = & 6 \\ 2x_1 & - & 3x_2 & + & 5x_3 & - & x_4 & + & x_5 & = & 8 \\ & & & & 4x_3 & + & 3x_4 & + & 2x_5 & = & 3 \\ -2x_1 & + & 3x_2 & + & 3x_3 & + & 3x_4 & - & 9x_5 & = & -6 \end{array}$$

7. Say why the following matrix is NOT in RREF. Then reduce it to RREF (by hand).

$$\begin{pmatrix} 2 & 0 & 3 & 1 \\ 0 & 0 & 1 & 2 \end{pmatrix}$$

8. Reduce to RREF. Then express the third row of the RREF as a linear combination of the rows of the original matrix.

$$\begin{pmatrix} 1 & 2 & 1 \\ 0 & 4 & 0 \\ 3 & -1 & 0 \end{pmatrix}$$

9. Three truck drivers (in perhaps 1960) went into a roadside cafe. One truck driver purchased four sandwiches, a cup of coffee, and ten doughnuts for \$8.45. Another driver purchased three sandwiches, a cup of coffee, and seven doughnuts for \$6.30. What did the third truck driver pay for a sandwich, a cup of coffee, and a doughnut? (If your approach to this problem involves matrices and elimination, you may use technology.)