

- 1) FIND THE LEFTMOST COLUMN WITH A NONZERO ENTRY.
- 2) INTERCHANGE THE TOP ROW WITH ANOTHER ROW, IF NECESSARY, TO BRING A NONZERO ENTRY TO THE TOP OF THE COLUMN FOUND IN STEP 1.
- 3) IF THE ENTRY AT THE TOP OF THE COLUMN FOUND IN STEP 1 IS "A", MULTIPLY THE FIRST ROW BY $\frac{1}{A}$.
- 4) ADD MULTIPLES OF THE TOP ROW TO THE ROWS BELOW SO THAT ALL ENTRIES BELOW THE LEADING 1 BECOME ZEROS.
- 5) COVER THE TOP ROW AND BEGIN AGAIN WITH STEP 1 APPLIED TO THE RESULTING SUBMATRIX. CONTINUE IN THIS WAY UNTIL ROW-ECHELON FORM.
- 6) BEGINNING WITH THE LAST ROW AND WORKING UPWARD, ADD MULTIPLES OF EACH ROW TO THE ROWS ABOVE TO INTRODUCE ZEROS ABOVE THE LEADING 1'S.

A SYSTEM IS SAID TO BE HOMOGENEOUS IF THE CONSTANT TERMS ARE ALL ZERO. THE SOLUTION $x_1 = 0, x_2 = 0, \dots, x_n = 0$ IS CALLED THE TRIVIAL SOLUTION. IF THERE ARE OTHER SOLUTIONS, THEY ARE CALLED NON-TRIVIAL.

THEOREM— A HOMOGENEOUS SYSTEM OF LINEAR EQUATIONS WITH MORE UNKNOWN THAN EQUATIONS HAS ∞ MANY SOLUTIONS.